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Белорусский национальный технический университет

Кафедра «Английский язык № 2»

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АНГЛИЙСКИЙ ЯЗЫК ДЛЯ ИНЖЕНЕРОВ-МЕХАНИКОВ

ENGLISH FOR MECHANICAL ENGINEERS

Пособие

для студентов специальности

1-36 11 01 «Подъемно-транспортные, строительные,
дорожные машины и оборудование»

*Рекомендовано учебно-методическим объединением по образованию
в области строительства и архитектуры*

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Пособие направлено на формирование навыков профессионально-ориентированной устной и письменной речи на базе тематически упорядоченного лексико-грамматического материала. Основу пособия составляют 14 разделов, также включён словарь машиностроительных терминов, справочный материал по аннотированию и реферированию текстов, созданию электронной и постерной презентаций.

Пособие предназначено учащимся, студентам, магистрантам, аспирантам, специалистам в области подъемно-транспортных, строительных, дорожных машин и оборудования, преподавателям технических вузов и вузов.

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ПРЕДИСЛОВИЕ

Пособие имеет профессиональную направленность и предназначено для проведения практических занятий со студентами специальности 1-36 11 01 «Подъёмно-транспортные, строительные, дорожные машины и оборудование».

Цель пособия – систематизация знаний и совершенствование навыков студентов, обогащение их словарного запаса в пределах профессионально-ориентированной лексики, формирование навыков правильного понимания, перевода и реферирования текстов по специальности.

Пособие состоит из четырнадцати уроков, посвященных профессии инженера-механика и основным видам подъёмно-транспортных, дорожных и строительных машин и оборудования, словаря профессиональных терминов, рекомендаций по аннотированию и реферированию научно-технических текстов, а также подготовке презентаций. Пособие включает обширный иллюстративный материал, что позволяет более точно и полно понять материал по специальности.

В каждом уроке наряду с текстами из аутентичных специализированных источников предлагаются упражнения на их понимание, а также разнообразные языковые и речевые задания. Большое внимание уделяется работе с профессиональной лексикой – нахождению синонимов, антонимов, словообразованию. Используются задания на понимание смысла термина через его толкование, упражнения на перевод с английского на русский и наоборот. Речевые упражнения позволяют проверить общее понимание прочитанного, закрепить приобретённые лексические навыки и предполагают обучение говорению на базе прочитанного текста. В конце каждого урока предусмотрены задания на развитие навыков монологической и диалогической речи.

Пособие может также использоваться для самостоятельного повышения уровня владения английским языком в области подъёмно-транспортных, строительных, дорожных машин и оборудования.

Автор выражает искреннюю благодарность всем специалистам, которые оказали помощь в подготовке, апробации и издании этого пособия.

UNIT 1

MECHANICAL ENGINEERING

Pre-reading tasks

1. Study the terms.

a) engineering	1) техника; 2) технология; 3) разработка; проектирование; конструирование; 4) машиностроение; 5) строительство
mechanical engineering	машиностроение
civil engineering	гражданское строительство
electrical engineering	электротехника
chemical engineering	химическое машиностроение
aerospace engineering	авиакосмическая техника
petroleum engineering	технология добычи нефти
computer-aided engineering	автоматическое конструирование
branch	отрасль
field	область
b) engineer	инженер
mechanical engineer	инженер-механик, машиностроитель
c) education	образование
skill	навык
course work (in)	курсовая работа
summer engineering job	работа на летних каникулах по инженерному профилю
d) core course (in)	основной курс (учебной программы)
specialized course (in)	спецкурс
the sciences	точные науки
math (=mathematics)	математика
advanced mathematics	высшая математика
chemistry	химия
physics	физика

mechanics
fluid mechanics
materials science
kinematics
thermodynamics
robotics
structural analysis
manufacturing process
environmental sciences

механика
механика жидкостей и газов
материаловедение
кинематика
термодинамика
робототехника
структурный анализ
промышленная технология
науки об окружающей среде

e) motion
energy
force
heat

движение
энергия
сила
тепло

f) machinery

машины; оборудование;
механизмы

machine
electric generator
internal combustion engine
turbine
refrigeration equipment
air-conditioning equipment

машина; механизм
электрогенератор
двигатель внутреннего сгорания
турбина
холодильное оборудование
установка для кондиционирова-
ния воздуха

tool
machine-tool

инструмент
станок

g) through
out of date

через, посредством
устаревший

2. Match the equivalents.

- 1) a second language
- 2) core concepts
- 3) current technology
- 4) development
- 5) good communication skills
- 6) in co-operation with

- a) исследовательская лабора-
тория
- b) мастер на все руки
- c) ещё один язык
- d) современная технология
- e) сильные и слабые стороны
- f) в сотрудничестве с

- | | |
|--|---|
| 7) to satisfy the needs of society | g) принимать решения |
| 8) jack-of-all trades | h) удовлетворять нужды общества |
| 9) strengths and weaknesses | i) ключевые понятия |
| 10) professional likes and dislikes | j) применять все теории и правила |
| 11) research lab | k) давать возможность |
| 12) through mechanical solutions | l) охватывать широкий ряд вопросов |
| 13) throughout their careers | m) пройти курс по |
| 14) to offer an opportunity | n) хорошие навыки общения |
| 15) to make decisions | o) развитие |
| 16) to apply all the theories and principles | p) что нравится и не нравится в профессии |
| 17) to decide the size, shape, and material | q) прослеживается назад на несколько тысячелетий |
| 18) is traced back several thousand years | r) путём нахождения решений с помощью механики |
| 19) to span a broad range of problems | s) на протяжении всей своей трудовой деятельности |
| 20) to take courses in | t) определять размер, форму и материал |

3. Learn to recognize international words. Give the Russian equivalents to the following words without a dictionary. Then compare your variants with the dictionary.

design	material	profession
discipline	principle	result
energy	physics	to analyze
industrial	process	to combine
machine		

4. Use the dictionary to translate the words.

to appear	to develop	to overlap (<i>with</i>)
to create	to employ	to work (<i>on</i>)
to design	to involve	to be concerned (<i>with</i>)
to determine		

5. Read and translate the following groups of international words.

- 1) construction (n) – constructor (n) – to construct (v) – constructional (adj) – constructed (part. II)
- 2) design (n) – designing (n) – designer (n) – to design (v)
- 3) development (n) – developer (n) – to develop (v) – developing (adj.) – developed (part. II)
- 4) electricity (n) – electrician (n) – to electrify (v) – electric(al) (adj) – electrified (part II)
- 5) electronics (n) – electronic (adj)
- 6) engineering (n) – engineer (n) – engine (n) – to engineer (v) – engineering (adj) – engineered (part II)
- 7) industry (n) – industrialization (n) – to industrialize (v) – industrial (adj) – industrialized (part. II)
- 8) machine (n) – machinist (n) – machinery (n)
- 9) mechanism (n) – mechanization (n) – mechanic (n) – to mechanize (v) – mechanical (adj)
- 10) manufacture (n) – to manufacture (v) – manufacturer (n)
- 11) operation (n) – operator (n) – to operate (v) – operational (adj)
- 12) product (n) – production (n) – productivity (n) – producer (n) – to produce (v) – productive (adj)
- 13) specialty (n) – specialization (n) – specialist (n) – to specialize (v) – specialized (part. II)
- 14) technique (n) – technician (n) – technical (adj) – polytechnical (adj)
- 15) technology (n) – technologist (n) – technological (adj)

6. Arrange the following words according to the pronunciation of the combination of letters “ch”. Pronounce the words carefully.

[tʃ]	[k]	[ʃ]
arch	school	machine
...

- | | | | |
|----------------|-----------|---------------|------------|
| technology | mechanism | technological | chute |
| characteristic | stomach | technical | chemistry |
| chemist | change | chance | chronology |

technique	mechanic	channel	scheme
polytechnic	chassis	character	choose
challenge	chemical	Chicago	machine-tool
choice	mechanical	scholar	characterize

7. Put the headings in the grey boxes: *adjective, subject/science, equipment, person, scientific concept*. Underline the stressed syllables in the words in the white boxes:

<i>noun</i>				
en·gin· <u>eer</u>	<u>en</u> ·gine	en·gin· <u>eer</u> ·ing		
el·ec·tri·cian			el·ec·tri·ci·ty	el·ec·tric·al
		el·ec·tron·ics	el·ec·tron	el·ec·tron·ic
mech·an·ic	mech·an·ism	mech·an·ics		mech·an·ic·al
tech·ni·cian				tech·ni·cal
tech·no·lo·gist		tech·no·lo·gy		tech·no·lo·gic·al
chem·ist		chem·is·try		chem·i·cal

8. Correct the mistakes in the sentences.

- 1) My brother is a mechanism. He studied mechanical at technique college.
- 2) We need to find a good electricity to repair the electrician wires in the house.
- 3) I'm a computer technical. How can I help you?
- 4) I'm studying for a diploma in electronic. I want to be an electron engineer.

9. Fill in the gaps.

1. The _____ is responsible for every _____ in the factory. (engineering / engineer / engine)
2. I'm a _____, but I want to become a _____ engineer. (mechanical / mechanic / mechanics)
3. The laboratory _____ maintains all the _____ equipment. (technician / technical / technology)

4. The _____ repairs all the _____ equipment of the ship. (electrical / electrician / electricity)

10. Follow the rules of translating attributive word combinations and do the tasks bellow.

- a) hand hoist: *hand* (рука) + *hoist* (маль) = ...
worm gear: *worm* (червяк) + *gear* (шестерня) = ...
roller chain: *roller* (ролик) + *chain* (цепь) = ...
road roller: *road* (дорога) + *roller* (каток) = ...
guide roller: *guide* (направлять) + *roller* (ролик) = ...
bridge crane: *bridge* (мост) + *crane* (кран) = ...
storage battery: *storage* (аккумулятор) + *battery* (батарея) = ...
elevator shaft: *elevator* (лифт) + *shaft* (шахта) = ...
freight elevator: *freight* (груз) + *elevator* (лифт) = ...
induction pump: *induction* (индукция) + *pump* (насос) = ...
construction equipment: *construction* (строительство) + *equipment* (оборудование) = ...
bucket loader: *bucket* (ковш) + *loader* (погрузчик) = ...
excavator bucket: *excavator* (экскаватор) + *bucket* (ковш) = ...
asphalt paver: *asphalt* (асфальт) + *paver* (укладчик) = ...
steel teeth: *steel* (сталь) + *teeth* (зубья) = ...
diesel engine: *diesel* (дизель) + *engine* (двигатель) = ...
turbine engine: *turbine* (турбина) + *engine* (двигатель) = ...
project development: *project* (проект) + *development* (разработка) = ...
conveyor belt: *conveyor* (конвейер) + *belt* (лента) = ...
screw conveyor: *screw* (винт) + *conveyor* (конвейер) = ...
cable-laying machine: *cable* (кабель) + *lay* (класть) + *machine* (машина) = ...
- b) engineering discipline, mechanical engineering students, engineering profession, university education, laboratory technician, university level

Reading task

11. Read the text carefully.

*«Scientists investigate that which already is.
Engineers create that which never was.»*

ALBERT EINSTEIN

Mechanical engineering is a branch of engineering that applies the principles of physics and materials science for analysis, design, manufacturing, and maintenance of mechanical systems. It involves the production and usage of heat and mechanical power for the design, production, and operation of machines and tools. It is one of the oldest and broadest engineering disciplines.

Mechanical engineering appeared as a field during the industrial revolution in Europe in the 18th century. However, its development can be traced back several thousand years around the world. As science, mechanical engineering appeared in the 19th century as a result of developments in the field of physics. Mechanical engineering overlaps with aerospace engineering, civil engineering, electrical engineering, petroleum engineering, and chemical engineering.

Mechanical engineers use these core principles and tools like computer-aided engineering to design and analyze electric generators, internal combustion engines, turbines, refrigeration and air-conditioning equipment, machine-tools and other machinery.

The mechanical engineer is the jack-of-all trades among engineering professions. This is because the profession requires education and skills that span a broad range of technical, social, environmental, and economic problems. In general, however, the mechanical engineer is concerned with controlling the principles of motion, energy, and force through mechanical solutions.

Mechanical engineers are constantly being asked to make decisions. They must decide the size, shape, and material of every part of every mechanical product that is created. They also have to determine the best and most efficient ways to manufacture the products. Often those decisions are made in co-operation with other types of engineers. Some of the decisions they make can mean the difference between life and death:

the safety features of automobiles, for example, are the responsibility of mechanical engineers.

Practically every company that designs and produces a product employs a mechanical engineer. But mechanical engineers can also be found in research labs, the military, government, and in other professions such as medicine, or teaching.

Engineers must combine a good understanding of science, mathematics, and computers with a good knowledge of current technology. In addition to the sciences and math, engineers need good communication skills. Besides, a second language can be extremely valuable because many large industrial firms that employ mechanical engineers are multinational.

At the university level, mechanical engineering students learn advanced mathematics, chemistry, and physics. After some of these core courses, mechanical engineering students take specialized courses in fluid mechanics, materials science, robotics, manufacturing processes, thermodynamics, environmental sciences.

After starting coursework in mechanical engineering, it is useful to have a summer engineering job. It helps you learn the "real world" of engineering and offers an opportunity to apply all the theories and principles taught in class. Besides, it can also help you determine your professional likes and dislikes, your strengths and weaknesses.

Mechanical engineers often continue their education throughout their careers, because technology changes rapidly. Many of the skills a student learned at the university will become out of date after only a few years.

Comprehension check

12. Continue the phrases.

1. A summer engineering job helps you...
2. After starting coursework in mechanical engineering...
3. Engineers must combine...
4. Many of the skills a student learned at the university...
5. Mechanical engineering involves the production and usage of heat and mechanical power for...
6. Mechanical engineering requires an understanding of...
7. Mechanical engineers can also be found in...

8. Mechanical engineers take specialized courses in...
9. The development of mechanical engineering can be traced back several...
10. The mechanical engineer is concerned with...

13. Insert the missing words.

1. ... mechanical engineering students learn advanced mathematics, chemistry, and physics.
2. ... the sciences and math, engineers need good communication skills.
3. A summer engineering job can also help you determine... .
4. As science, mechanical engineering appeared in the 19th century ... in the field of physics.
5. In general the mechanical engineer is concerned with controlling the principles of ... through mechanical solutions.
6. Mechanical engineering appeared as a field ... in Europe in the 18th century.
7. Mechanical engineering is a branch of engineering that applies ... for analysis, design, manufacturing, and maintenance of mechanical systems.
8. Practically every company that ... employs a mechanical engineer.
9. The mechanical engineer is ... among engineering professions.

14. State whether the statements are true or false. Correct if necessary.

1. A coursework in mechanical engineering helps you learn the "real world" of engineering and offers an opportunity to apply all the theories and principles taught in class.
2. As science, mechanical engineering appeared in the 19th century as a result of developments in the field of chemistry.
3. Many large multinational industrial firms employ mechanical engineers.
4. Mechanical engineering appeared as a field during the industrial revolution in Europe in the 19th century.
5. Mechanical engineers can never be found in medicine, or teaching.

6. Mechanical engineers design and analyze electric generators, internal combustion engines, turbines, refrigeration and air-conditioning equipment, machine-tools and other machinery.
7. Mechanical engineers don't continue their education throughout their careers.
8. Mechanical engineers make decisions in co-operation with other types of engineers.
9. None of the decisions that mechanical engineers make mean the difference between life and death.
10. The safety features of automobiles are not the responsibility of mechanical engineers.

15. Answer the questions.

1. What is mechanical engineering?
2. Is mechanical engineering the oldest or the newest engineering discipline?
3. When did mechanical engineering appear as a field? As a science?
4. Mechanical engineering overlaps with other branches of engineering, doesn't it?
5. Why is the mechanical engineer the jack-of-all trades among engineering professions?
6. Where can mechanical engineers be employed?
7. Why is it valuable for a mechanical engineer to know a second language?
8. What knowledge and skills must mechanical engineers have?
9. What disciplines do mechanical engineering students study?
10. Why is it useful for a mechanical engineering student to have a summer engineering job?
11. Why do mechanical engineers often continue their education throughout their careers?

Vocabulary practice

16. Complete the text translating the words in brackets.

The term 'engineering' is a modern one. Dictionaries (1) ... (определяют) the word 'engineering' as the (2) ... (практическое) applica-

tion of scientific and mathematical (3) ... (принципы). Nowadays the term 'engineering' means, as a rule, the art of (4) ... (проектирования), constructing, or using (5) ... (двигателей).

Engineering is divided into many (6) ... (отрасли). Up to 1750s there were only two main branches of engineering – (7) ... (гражданское) and military. It is well-known that with the invention of the steam engine and the growth of factories some civil engineers became interested in the practical application of (8) ... (механика) and (9) ... (термодинамика) to the machine design. They split off and were called (10) ... (инженеры-механики).

Note:

application	применение
art	искусство
constructing	создания
steam engine	паровой двигатель
ti split (<i>split</i> ; <i>split</i>) off	отделиться

17. Match the words with their definitions.

- | | |
|-----------------------------------|---------------------------------------|
| (a) <i>aerospace engineering</i> | (b) <i>chemical engineering</i> |
| (c) <i>civil engineering</i> | (d) <i>computer-aided engineering</i> |
| (e) <i>electrical engineering</i> | (f) <i>mechanical engineering</i> |
| (g) <i>petroleum engineering</i> | |

1. Engineering activities related to the production of crude oil (сырая нефть) or natural gas.
2. The branch of engineering concerned with the design and construction such public works as roads, dams, bridges, or harbours.
3. The branch of engineering that deals with the design, construction and operation of machinery.
4. The branch of engineering that deals with the development, design and testing of aircrafts and space vehicles.
5. The branch of engineering that deals with the use of chemistry in industry.
6. The branch of engineering that studies the uses of electricity and the equipment for power generation and distribution and the control of machines and communication.

7. Use of computers during the planning design and analysis of engineering projects.

18. Look and identify the products. Match each of the products with one of engineering disciplines (ex 17). Justify your answer.



(a)



(b)



(c)



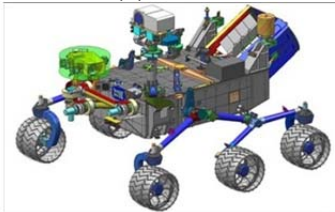
(d)



(e)



(f)



(g)

- 1) asphalt
- 2) bridge
- 3) computer model of a Mars Rover
- 4) crane
- 5) electric main
- 6) oil well
- 7) space station

Language focus

19. Match the synonyms.

1) branch; 2) company; 3) create; 4) principle; 5) rapidly
a) concept; b) field; c) firm; d) make; e) quickly

20. Match the antonyms.

1) current; 2) likes; 3) life; 4) safety; 5) strength
a) danger; b) death; c) dislikes; d) out of date; e) weakness

21. Translate the following phrases paying attention to the underlined words that can be verbs, nouns, adjectives or adverbs without changing their form and adding suffixes.

1. core course; core principle; core concept
2. to choose a career; technical career; engineers continue their education throughout their careers
3. the development of the engine; industrial development

Reading Practice

22. Here are 6 principles of preparing for an engineering career. Look through them and try to predict what each of them is about. Then read the abstracts below and match them with the corresponding principles.

1. Develop problem-solving skills.
2. Study successful people.
3. Examine yourself carefully and honestly.
4. Acquire an interdisciplinary technical education.
5. Prepare for the non-technical aspects of your technical career.
6. Develop practical skills.

(...) Watch them carefully to see what you can learn. They tend to have a great personal interest, a personal relationship with their technology. They usually have a passion for their work.

(...) Practise relevant summer work experience. This experience can be an advantage over other students and guarantee a minimum level of engineering competence.

(...) Try to understand your drawbacks. Strengthen your weaknesses.

(...) Companies need engineers who can understand the nature of inter-branch (межотраслевых) disciplines.

(...) Problem-solving skills are the most obvious manifestation of an initiative process and God-given engineering talent. But on the other hand, everyone has some degree of talent and even gifted people have to develop their gifts. You should develop those abilities by struggling with problems by yourself, ideally starting in early childhood.

(...) Narrow technical skills may get you in the door, but what moves you up in the ladder will be the things like the ability to communicate, to cooperate with people.

Writing Practice

23. Translate the text. Write a short paragraph summarizing it.

Mechanical engineering involves production, transition and use of mechanical power.

Mechanical engineers design, operate and test all kinds of machines. They develop and build engines that produce power from steam, petrol, nuclear fuels, and other sources of energy. They also develop and build different machines that use power, including heating and ventilation equipment, cars, machine tools, and industrial-processing equipment. Mechanical engineers are involved in every phase in the development of a machine, from the construction of an experimental machine to the installation of the finished machine and training of the workers who use it.

Mechanical engineers work in many industries, such as power generation, public utilities, transportation, and all types of manufacturing. Many mechanical engineers concentrate on research and development because new types of machinery are continually needed. Mechanical engineers are involved in every other branch of engineering, whenever a new or improved machine, device or piece of equipment is required.

Speaking practice

24. Read the text. Comment on each point. What else would you add to the list? Why?

An Engineer's Duties

The Main Duties:

1. An engineer must have a good understanding of documents (standards, specifications).
2. An engineer must know how to draw parts of mechanisms.
3. An engineer must study the structure of materials and their properties.
4. An engineer should be able to remove breaking-downs of machines and equipment.

5. An engineer must use other countries' experience.
6. An engineer must follow safety rules.

The Related Tasks:

1. An engineer should learn to work in a team.
2. An engineer is supposed to assist his/her colleagues.
3. An engineer is to guide other specialists and workers.
4. An engineer should develop his/her communication skills.
5. An engineer should be able to explain and find arguments for promoting and advertising innovative methods, materials, issues.
6. An engineer should develop his/her practical and personal abilities by studying foreign languages.

25. How do you understand Albert Einstein's words, "Scientists investigate that which already is. Engineers create that which never was."?

Summarizing

26. Speak on why you chose the career of a mechanical engineer.

27. Think and speak on:

- a) what the term 'engineering' means;
- b) the history of mechanical engineering;
- c) what mechanical engineering students study at the university;
- d) how to become a good engineer.

28. Discuss with your group mates or in pairs whether it is essential for an engineer to know foreign languages.

UNIT 2 SIMPLE MACHINES

Pre-reading tasks

1. Study the terms.

a) work	работа
effort	усилие
friction	трение
load	1) груз; 2) нагрузка
fulcrum	точка опоры
mechanical advantage	выигрыш в силе
b) machine	1) машина; 2) механизм
simple machine	простейший механизм
device	устройство
c) lever	рычаг
first-class lever	рычаг первого рода
second-class lever	рычаг второго рода
third-class lever	рычаг третьего рода
wheel and axle	колесо и ось
pulley	блок
single pulley	простой блок
inclined plane	наклонная плоскость
wedge	клин
screw	винт
d) simple	простой
complex	сложный
upward	направленный вверх
downward	направленный вниз
specialized	специализированный
standardized	стандартизированный
e) essentially	существенно
gradually	постепенно
entirely	полностью

2. Learn to recognize international words. Give the Russian equivalents to the following words without a dictionary. Then compare your variants with the dictionary.

activity	complex	energy	specialized
adaptation	cone	form	standardized
application	conveyor	machine	support
basic	cylinder	plank	type
centre	effectiveness	revolution	to combine
class	element	roller	to modify

3. Use the dictionary to translate the words.

to advance	to obtain	to slide
to apply	to operate	to supply
to attach (<i>to</i>)	to pass (<i>over</i>)	to turn
to construct	to roll	to wrap (<i>around</i>)
to equal	to serve (<i>as</i>)	

4. Match the equivalents.

- | | |
|---|---|
| 1) to satisfy needs | a) прилагать силу к |
| 2) to give control over | b) разрабатывать машины |
| 3) to harness the energy of | c) обуздать энергию |
| 4) to do work | d) уменьшать трение |
| 5) to exert force on | e) вгонять ударами |
| 6) to develop machines | f) производить работу |
| 7) to reduce friction | g) удовлетворять потребности |
| 8) to drive by blows | h) давать контроль над |
| 9) early people | i) обод колеса |
| 10) in a complex way | j) сложным образом |
| 11) machine age | k) угол тонкого торца |
| 12) the ratio between | l) может свободно двигаться |
| 13) is allowed to move freely | m) век машин |
| 14) a variety of | n) разнообразие |
| 15) the edge of the wheel | o) древние люди |
| 16) an angle of the thin end | p) соотношение между |
| 17) wrapped in a spiral around a cylinder | q) обёрнутый по спирали вокруг цилиндра |

- 18) the length of the incline divided by the vertical rise r) отношение окружности винта к расстоянию
- 19) the ratio of the circumference of the screw to the distance s) длина наклона, поделенная на длину вертикального подъёма

5. Translate the sentences. Mind the degrees of the adjectives. Give the initial forms of the adjectives.

- The wedge is used to raise a **heavy** load over a **short** distance or to split a log.
- The inclined plane makes it **easier** to slide a load upward than to lift it directly.
- Without machines, residents of our cities will find it **more difficult** to live in.
- The wheel and axle can move a load **farther than** a lever can.
- The effort is **smaller than** the load because it is at a **greater** distance from the axle which is the fulcrum.
- A thin wedge is **more effective than** a thick one.
- The **smaller** the angle of an inclined plane, the **less** the force required to raise a given load.
- The **longer** the slope, the **smaller** the effort required. The amount of work, however, is no less than if the load were lifted directly upward.
- The lever is one of the **earliest** and the **simplest** machines.
- The wheel itself is regarded as one of the **most important** inventions of all time.

6. a. Study the mathematical expressions and do the tasks below.

- + plus
 – minus
 × times *or* multiplied by
 ÷ divided by
 = equals *or* is

Examples: $6 + 9 = 15$ *Six plus nine equals/is fifteen.*
 $13 - 2 = 11$ *Thirteen minus two equals/is eleven.*

$$5 \times 6 = 30 \quad \begin{array}{l} \text{Five times six equals/is thirty.} \\ \text{Five sixes equal/are thirty.} \\ \text{Five multiplied by six equals/is thirty.} \end{array}$$

$$18 \div 3 = 6 \quad \text{Eighteen divided by three equals/is six.}$$

b. Work through the examples. Read the examples minding the numerals.

$$0.5 + 7.2 = \quad 1,101 - 0.01 = \quad 11 \times 5 = \quad 143 \div 13 =$$

$$86,041 + 402 = \quad 983 - 53 = \quad 27 \times 8 = \quad 61,875 \div 99 =$$

c. Translate the sentences. Mind the mathematical expressions.

1. The mechanical advantage will be four to one.
2. Distance equals time multiplied by velocity.
3. Work is force multiplied by distance.
4. Power is work divided by time.
5. Power is force multiplied by velocity.
6. Kinematic energy plus potential energy equals mechanical energy.
7. The mechanical advantage of an inclined plane is the length of the incline divided by the vertical rise.
8. The mechanical advantage of a single pulley equals 1.

7. Play FIZZ BUZZ.

Count from 1 to 100 round the class.

Use *Fizz* for a number you can divide by 3. *Example: 3, 6, 9, 12, ...*

Use *Buzz* for a number you can divide by 5. *Example: 5, 10, 15, ...*

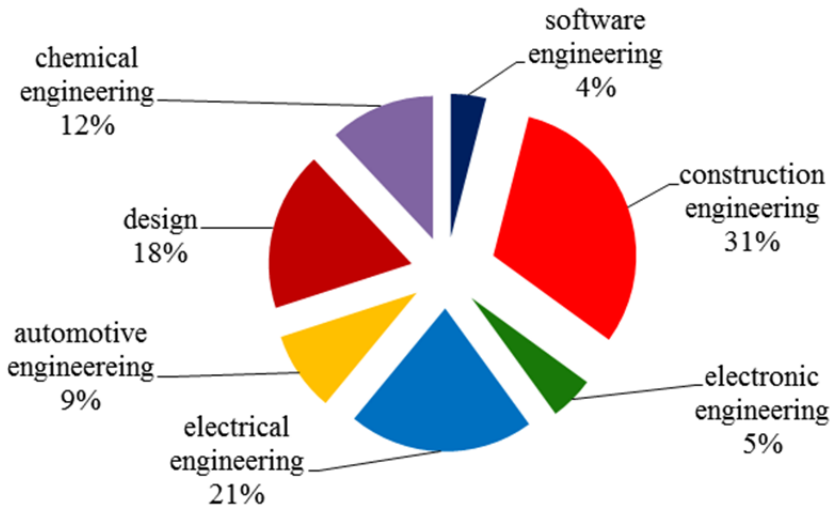
Use *Fizz Buzz* for a number you can divide by both 5 and 3. *Example: 15, 30, ...*

If you make a mistake, you are OUT of the game.

Start like this: 1, 2, Fizz, 4, Buzz, Fizz, 7, 8, Fizz, Buzz, 11, Fizz, 13, ...

8. This pie chart shows the percentage of students studying different subjects in an industrial college. Describe the chart using fractions and approximations: *almost, less than, more than, just under, just over, nearly, approximately, exactly.*

Model: Less than one twentieth of the students are studying software engineering.



9. Following the rules of translating simple sentences, analyze the simple sentences and translate them.

1. A combination of ropes, pulleys, and pulley blocks arranged to raise a load is referred to as block and tackle.
2. A pivoted rigid bar used to multiply force or motion is called the lever.
3. A plane surface inclined at an angle with the line of the action of the exerted force is an inclined plane.
4. A wheel with a flat or grooved edge is a pulley.
5. All machines are based in some way on six types of simple machines.
6. For practical purposes a screw may be considered as a wedge wound in a form of a spiral.
7. The gear drive and hydraulic press may also be considered as simple machines.
8. The principles of operation and applications of simple machines depend on closely related concepts.
9. To operate these improved machines, people harnessed the energy of falling water and of coal, oil, and the atom.
10. Today we use so many machines.

Reading task

10. Read the text carefully.

Machine is a device that does work. Almost every activity in our daily life depends in some way on machines.

People have constructed a wide variety of machines to satisfy their needs. Early people made stone axes that served as weapons and tools. The machines that were gradually developed gave people great control over their environment. To operate these improved machines, people harnessed the energy of falling water and of such fuels as coal, oil, and the atom. Today, we use so many machines that the age we live in is often called the machine age.

Most machines consist of a number of elements, such as gears and ball bearings that work together in a complex way. But no matter how complex they are, all machines are based in some way on six types of simple machines. These six types of machines are the lever, the wheel and axle, the pulley, the inclined plane, the wedge, and the screw.

Lever. There are three basic types of levers, depending on where the effort is applied, on the position of the load, and on the position of the fulcrum. In a first-class lever, such as a crossbar, the fulcrum is between the load and the applied force. In a second-class lever, such as a wheelbarrow, the load lies between the fulcrum and the applied force. In a third-class lever, the effort is applied between the load and the fulcrum. For example, when a person lifts a ball in the palm of the hand, the load is on the hand and the fulcrum is at the elbow. The forearm supplies the upward force that lifts the ball.

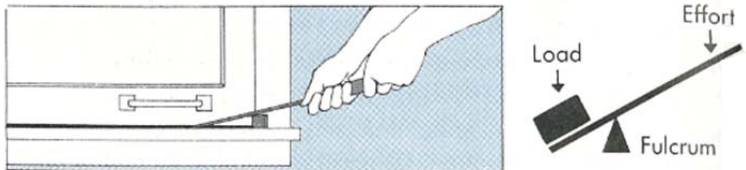


Figure 1. The lever

Wheel and axle. The wheel and axle is essentially a modified lever, but it can move a load farther than a lever can. In a windlass used to raise

water from a well, the rope that carries the load is wrapped around the axle of the wheel. The effort is applied to a crank handle on the side of the wheel. The centre of the axle serves as a fulcrum. The mechanical advantage of the windlass depends on the ratio between the radius of the wheel and the distance from the centre of the axle to the crank handle.

Sometimes teeth called cogs are placed around the edge of the wheel, as in the sprocket of a bicycle or in a cogwheel.

The wheel-and-axle machine has important applications when it is used to transport heavy goods by rolling rather than by sliding. The wheel itself is regarded as one of the most important inventions of all time. It is widely used in all types of machinery.



Figure 2. The wheel and axle

Pulley. A pulley is a wheel over which a rope or belt passes. It is a form of the wheel and axle. The mechanical advantage of a single pulley equals 1, because the downward force exerted on the rope equals the weight lifted by the other end of the rope that passes over the pulley. The main advantage of the single pulley is that it changes the direction of the force. For example, to lift a load, a person can conveniently pull down the rope, using the weight of the body. When one pulley is attached to a support and another is attached to the load and allowed to move freely, a definite mechanical advantage is obtained.

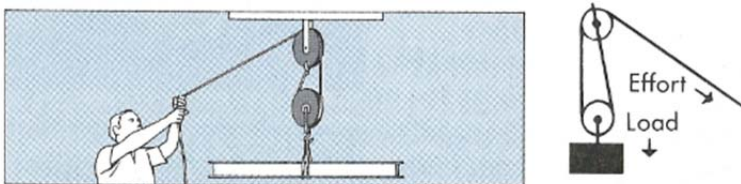


Figure 3. The pulley

Inclined plane. The inclined plane is such a simple device that it hardly looks like a machine at all. The average person cannot raise a 100 kilogram box up 1 metre into the rear of the truck. But by placing a 4 metre plank from the truck to the ground, a person could raise the load easily. If there were no friction, the force required to move the box would be exactly 25 kilograms. The mechanical advantage of an inclined plane is the length of the incline divided by the vertical rise. By adding rollers, it is possible to make a roller conveyor that will reduce friction and have great efficiency.

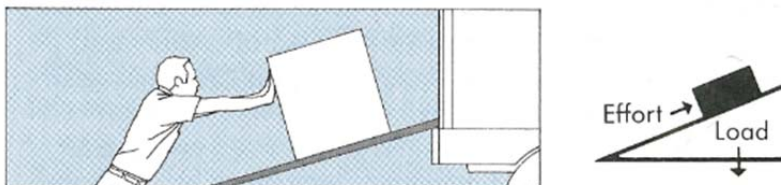


Figure 4. The inclined plane

Wedge. The wedge is an adaptation of the inclined plane. It can be used to raise a heavy load over a short distance or to split a log. The wedge is driven by blows from a mallet or sledgehammer. The effectiveness of the wedge depends on an angle of the thin end. The smaller the angle, the less the force required to raise a given load.

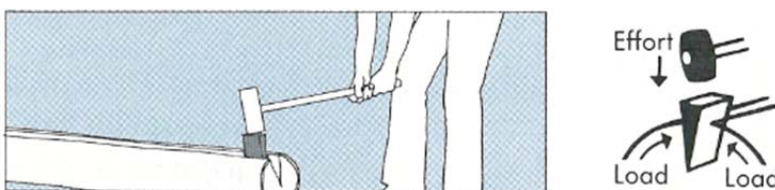


Figure 5. The wedge

Screw. The screw is actually an inclined plane wrapped in a spiral around a cylinder or a cone. The mechanical advantage of a screw is approximately the ratio of the circumference of the screw to the distance the screw advances during each revolution.

A jackscrew, such as those used to raise homes and other structures, combines the usefulness of the screw and the lever. The lever is used to turn the screw. The mechanical advantage of a jackscrew is quite high, and a small effort will raise a heavy load.

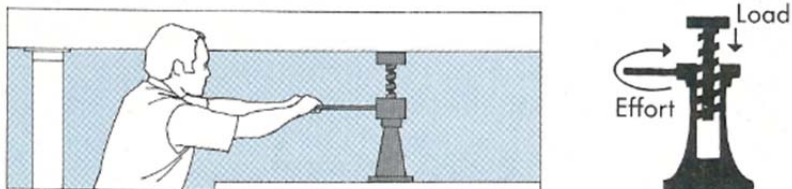


Figure 6. The jackscrew

By combining the principles of simple machines engineers develop new and specialized machines. The parts for many of these machines are often standardized so they can be used in a variety of machines that perform entirely different tasks.

Comprehension check

11. Continue the phrases.

1. A pulley is...
2. Almost every activity in our daily life depends in some way on...
3. Machine is a device that...
4. The centre of the axle serves as...
5. The effectiveness of the wedge depends on...
6. The machines that were gradually developed gave people...
7. The mechanical advantage of a screw is...
8. The six types of simple machines are...
9. The wedge is an adaptation of...
10. The wheel and axle is...
11. There are three basic types of levers, depending on...
12. To operate these improved machines, people harnessed the energy of...
13. Today, we use so many machines that the age we live in is often called...

12. Insert the missing words.

1. ... is regarded as one of the most important inventions of all time.
2. ... is such a simple device that it hardly looks like a machine at all.
3. By ... engineers develop new and specialized machines.
4. Early people made ... that served as weapons and tools.
5. In ..., such as a crossbar, the fulcrum is between the load and the applied force.
6. In ..., such as a wheelbarrow, the load lies between the fulcrum and the applied force.
7. In ..., the effort is applied between the load and the fulcrum.
8. Sometimes teeth called ... are placed around the edge of the wheel, as in the sprocket of a bicycle or in a cogwheel.
9. The effort is applied to ... on the side of the wheel.
10. The mechanical advantage of an inclined plane is the length of the incline ... the vertical rise.
11. The screw is actually ... wrapped in a spiral around a cylinder or a cone.
12. The wedge is driven by ... from a mallet or sledgehammer.
13. The wheel-and-axle machine has important applications when it is used to ... by rolling rather than by sliding.

13. State whether the statements are true or false. Correct if necessary.

1. A cogwheel is a wheel with teeth called cogs.
2. All machines are based in some way on 6 types of simple machines.
3. Coal, oil, and the atom are fuels.
4. Early people made stone axles that served as weapons and tools.
5. Sometimes teeth called cogs are placed around the edge of the wedge.
6. The age we live in is often called the machine age.
7. The effectiveness of the wedge depends on an angle of the thick end.
8. The inclined plane can be used to raise a heavy load over a short distance or to split a log.
9. The mechanical advantage of a jackscrew is quite low.
10. The screw is widely used in all types of machinery.
11. The wheel and axle is essentially a modified inclined plane.
12. There are three basic types of levers, depending on where the effort is applied, on the position of the load, and on the position of the fulcrum.

14. Answer the questions.

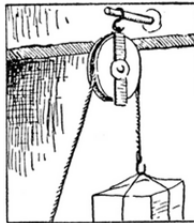
1. Is the machine a device that does work?
2. The time we live in is often called the age of machines, isn't it?
3. Did people start to construct machines in early times?
4. How many simple machines are there? What are they? Which of them are adaptations of the lever? Of the inclined plane?
5. What types of the lever do you know? What are they? How do they work?
6. The wheel itself isn't regarded as one of the most important inventions of all time, is it?
7. What is the main advantage of the single pulley?
8. How is the mechanical advantage of the inclined plane counted?
9. Where can the wedge be used?
10. Where do engineers apply the principles of simple machines?

Vocabulary practice

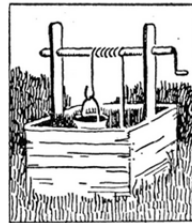
15. What simple machines are pictured? Which of these simple machines are used in your technical field? How are they used? Explain to the class.



(a)



(b)



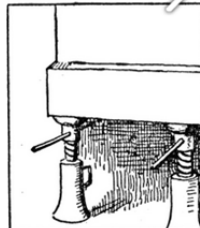
(c)



(d)



(e)



(f)

16. Complete the text using the words from the list below.

- (a) less (b) pushing (c) load (d) lifting
(e) device (f) small (g) heavy (h) inclined plane
(i) simple machines

The (1) ... is a (2) ... used to raise a (3) ... load with relatively (4) ... force. For example, (5) ... a load up a ramp onto a platform requires (6) ... effort than (7) ... the load onto the platform, because the (8) ... travels farther. The inclined plane is one of the six (9)

17. Complete the text translating the words in brackets.

In (1) ... (**механизмы**) that transmit only mechanical (2) ... (**энергия**), the (3) ... (**отношение**) of the (4) ... (**сила**) exerted by the machine to the force applied to the machine is known as (5) ... (**выигрыш в силе**). This can be demonstrated with a (6) ... (**перекладина**), which is a type of (7) ... (**рычаг**). When one end of the crossbar is directly under the weight, a part of the crossbar must rest on a (8) ... (**опора**) called (9) ... (**точка опоры**). (10) ... (**Чем ближе**) the fulcrum is to the load, (11) ... (**тем меньший**) the effort required to (12) ... (**поднять**) the load by pushing down the handle of the crossbar, and (13) ... (**тем больше**) the mechanical advantage of the crossbar. For example, if the (14) ... (**груз**) is 200 kilograms, and the distance from the load to the fulcrum is one fourth of the distance from the handle to the fulcrum, it will take 50 kilograms of (15) ... (**усилие**) to raise the load. Therefore, the mechanical advantage will be four to one. But the distance the load will be moved will be only one fourth of the distance through which the effort (16) ... (**прилагается**).

18. Match the words with their definitions.

- (a) inclined plane (b) pulley (c) lever
(d) screw (e) wedge (f) wheel and axle

1. A simple machine for raising loads that consists of a plane surface that makes an acute angle with the horizontal; a ramp.
2. A simple machine of the inclined-plane type that consists of a spirally grooved cylinder or a cone.

3. A simple machine shaped like a V that can be pushed between two things to separate them.
4. A simple machine that consists of a wheel attached to an axle that rotate together and force is transferred from one to the other.
5. A simple machine that consists of a wheel with a groove in which a rope can run to change the direction or point of application of a force applied to the rope.
6. A simple machine that gives a mechanical advantage when given a fulcrum.

Language focus

19. Match the synonyms.

- 1) apply; 2) great; 3) ramp; 4) efficiency; 5) do; 6) early
 a) perform; b) effectiveness; c) large; d) exert; e) inclined plane;
 f) ancient

20. Match the antonyms.

- 1) complex; 2) push; 3) upward; 4) thin; 5) low; 6) small; 7) short
 a) thick; b) simple; c) high; d) great; e) pull; f) downward; g) long

21. Translate the following words into Russian paying attention to the underlined words that can be verbs, nouns, adjectives or adverbs without changing their form and adding suffixes.

- 1) early morning; early people; I got up early yesterday.
- 2) machine age; the Middle Ages; What is your age?
- 3) a massive support; to support a wall; to support the idea.
- 4) a wide spiral; a spiral plane; the road spirals around the mountain.

22. What do the following mean?

km	kW	cm	yd
kg	ft	L	V
°C	ml	lb	g
°F	min	km/h	mm

Example: km = kilometre

Writing Practice

23. Translate the text in a written form. Write a short paragraph summarizing it.

The lever is one of the earliest and the simplest machines. Its advantage lies in the short distance between the fulcrum and load, and in the long distance between the fulcrum and the point where the effort is applied.

The wheel and axle has a rope attached to the axle to lift the load. The crank handle is the point where effort is applied. The effort is smaller than the load because it is at a greater distance from the axle which is the fulcrum.

The pulley consists of a grooved wheel over which a rope is passed. It is used to change the direction of the effort applied to the rope. A block and tackle uses two or more pulleys to reduce the effort needed to lift a load.

The inclined plane makes it easier to slide a load upward than to lift it directly. The longer the slope, the smaller the effort required. The amount of work, however, is no less than if the load were lifted directly upward.

The wedge, when struck with a mallet or sledgehammer, exerts a large force on its sides. A thin wedge is more effective than a thick one. The mechanical advantage of the wedge is of great importance.

The screw is a spiral inclined plane. The jackscrew is a combination of the lever and the screw. It can lift a heavy load with relatively small effort. Therefore, it has a very high mechanical advantage for practical purposes.

Speaking practice

24. a. Fill in the table.

- (a) boiler (b) compass (c) crane (d) hydraulic jack
(e) robot (f) spectacles (g) wedge (h) wind turbine
(i) watermill (j) abacus (k) lever (l) dragline
(m) stacker (n) needle (o) hoe

Simple machines	Tools	Heavy machine tools	Self-propelled machines

b. Work in pairs. What are the 10 most important tools in the history of mankind? Make a list in order of importance. Explain your choice. Give reasons for your group's choice.

Note: the tools must be *hand-held* or *easily portable*. Do not include *simple machines* (such as levers or pulleys), *heavy machine tools* (like hydraulic jacks) or *complex, self-propelled machines* (such as cars, windmills or computers).

Summarizing

25. What simple machines are used to construct these machines? Fill in the table.

Lever	Wheel and axle	Pulley	Inclined plane	Wedge	Screw



(a) block and tackle



(b) zipper



(c) inclined conveyor



(d) washing machine drum



(e) knife



(f) sewing needle



(g) truck ramp



(h) rostrum



(i) floor fan



(j) corkscrew



(k) plane wing



(l) caterpillar



(m) ladder



(n) scissors



(o) door



(p) piano keys



(q) auger



(r) engine



(s) door stop



(t) bicycle sprocket



(u) mincing machine



(v) crane



(w) slide



(x) concrete mixer

26. Make up a plan of the text (ex. 10).

27. Make an abstract of the text (ex. 10).

28. Think and speak on:

- e) how people use machines;
- f) the lever;
- g) the wheel and axle;
- h) the pulley;
- i) the inclined plane;
- j) the wedge;
- k) the screw.

29. Discuss with your group mates or in pairs what to add to the list of simple machines.

UNIT 3
HOISTING MACHINES: HOISTS AND WINCHES

Pre-reading tasks

1. Study the terms.

- | | | |
|----|--|--|
| a) | hoisting machine
elevating machine
sheave
pulley/block
block and tackle

winch
hand hoist
pneumatic/air hoist
lever hoist
differential hoist
worm geared hoist
spur geared hoist | грузоподъёмная машина
подъёмная машина
шкив
блок
полиспаст (система двух или не-
скольких блоков, соединённых
тросом)
лебёдка
ручная таль
пневматический подъёмник
рычажная таль
дифференциальные тали
червячная лебёдка
цилиндрическая лебёдка |
| b) | rope
cable
sling
hook
swivel hook
bucket
eye
trolley | трос, верёвка
трос
строп (канат для подъёма груза);
крюк
поворотный крюк
ковш
проушина
грузовая тележка |
| c) | drum
ratchet
pawl
brake
sprocket | барабан
храповый механизм
собачка (храпового механизма)
тормоз
цепное колесо; звёздочка |

2. Use the dictionary to translate the words.

to elevate	to be made up (<i>of</i>)	service
to lift	to suspend (<i>from</i>)	operation
to hoist	to mount (<i>on</i>)	to operate
to haul	to deposit	power
to attach (<i>to</i>)	to prevent (<i>from</i>)	to power

3. Match the equivalents.

- | | |
|-------------------------------------|--------------------------------------|
| 1) by power | a) грузоподъёмный механизм |
| 2) power unit | b) грузовой полиспасть |
| 3) structural element | c) свободно висящий на |
| 4) frictionless | d) громоздкий груз |
| 5) freely suspended from | e) блок питания |
| 6) hoisting mechanism | f) подводимая энергия |
| 7) bulky load | g) идти по блоку |
| 8) below-the-hook attachment | h) лишённый трения |
| 9) energy input | i) приводом от двигателя |
| 10) reciprocating motion | j) вращательное движение |
| 11) rotary motion | k) точка приложения сил |
| 12) hoisting tackle | l) элемент конструкции |
| 13) to run on the pulley | m) возвратно-поступательное движение |
| 14) point of application of a force | n) навесное оборудование (крана) |

4. Translate the sentences. Mind the modal verbs.

1. *Hoisting machines* **can pick up** loads at one location and **deposit** them at another.
2. *Hoists* **can be moved about** on wheel trolleys.
3. According to power source, *hoists* **can be** hand, electric, or pneumatic.
4. The drum **may be operated** manually or **by power**.

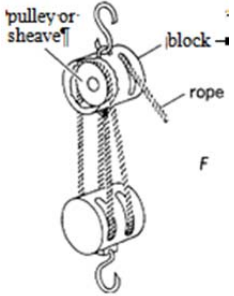
5. Following the rules of translating complex sentences, analyze the complex sentences and translate them.

1. A second language can be extremely valuable because many large industrial firms that employ mechanical engineers are multinational.
2. Differential hoists use only about one-third the energy input; they also prevent loads from running away during lowering.
3. Machine is a device that does work.
4. Mechanical engineering is a branch of engineering that applies the principles of physics and materials science for analysis, design, manufacturing, and maintenance of mechanical systems.
5. Some of the decisions mechanical engineers make can mean the difference between life and death.
6. The block and tackle is used where a large multiplication of the applied forces is needed.
7. The cable electric hoist has a drum around which a wire cable is coiled and uncoiled for hoisting and lowering.
8. The pulleys are grooved or flat wheels that are used to change the direction of motion or application of force of the rope or chain that runs on the pulleys.
9. The spur-gear type costs a lot, but is the most economical to operate.
10. This is because the profession of a mechanical engineer requires education and skills that span technical, social, environmental, and economic problems.
11. Early people made stone axes that served as weapons and tools.
12. The age we live in is often called the machine age.
13. Most machines consist of a number of elements that work together in a complex way.

Reading task

6. Read the text carefully.

Hoisting machines are mechanisms for raising and lowering material with intermittent motion. Such mechanisms hold the material freely suspended. They can pick up loads at one location and deposit them at another anywhere within a limited area. In contrast, **elevating machines** move their loads only in a fixed vertical path, and **monorails** operate on a fixed horizontal path over a limited area.



There are three principal components of hoisting machines:

- 1) sheaves and pulleys for the hoisting mechanism, called block and tackle;
- 2) winches and hoists for the power units;
- 3) cranes for the structural elements.

Block and tackle is a combination of a rope, cable or chain and independently rotating frictionless pulleys. The pulleys are grooved or flat wheels that are used to change the direction of motion or application of force of the rope or chain that runs on the pulleys. A swivel hook, an eye, or similar device can be attached to the pulley.

The block and tackle is used where a large multiplication of the applied forces is needed, for example as the hoisting tackle of cranes.

Winches and hoists. Normally, winches are designed for stationary service, but hoists are mounted, so that they can be moved about, for example, on wheel trolleys in connection with overhead crane operations.

A **winch** is basically a drum or cylinder around which cordage is coiled for hoisting or hauling. The drum may be operated manually or by power, using a worm gear or a spur gear. A ratchet and pawl prevent the load from slipping. Large winches are equipped with brakes. Winches are used as the power element for derricks and as the elevating mechanism with stackers.

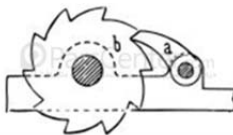


Figure 1. (a) Ratchet. (b) Pawl

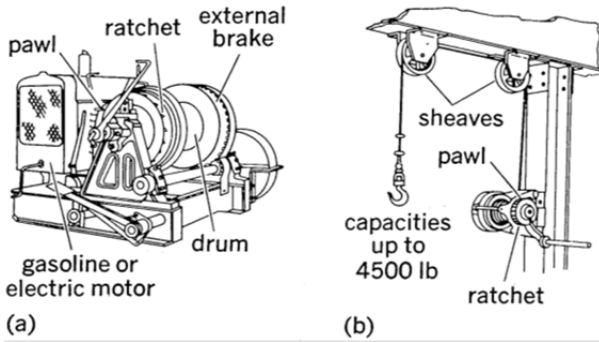


Figure 2. Powered and hand winches.
 (a) Heavy-duty single-drum winch. (b) Wire-rope hand winch

Hoists are designed to lift from a position directly above their loads. Heavy-duty types are standard equipment for moving heavy bulky loads. Hoists also serve as the power units of cranes and shovels.

According to power source, hoists can be hand, electric, or pneumatic.

Hand hoists are chain operated. There are four types: (a) lever, (b) differential, (c) worm geared and (d) spur geared.

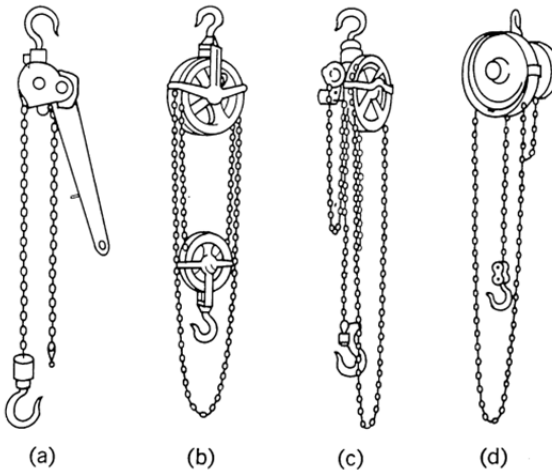


Figure 3. Chain hand hoists. (a) Lever (ratchet).
 (b) Differential. (c) Worm gear. (d) Spur gear

Electric hoists lift their loads by cable or chain. They are used for hoisting and hauling from fixed locations in industrial plants and warehouses.

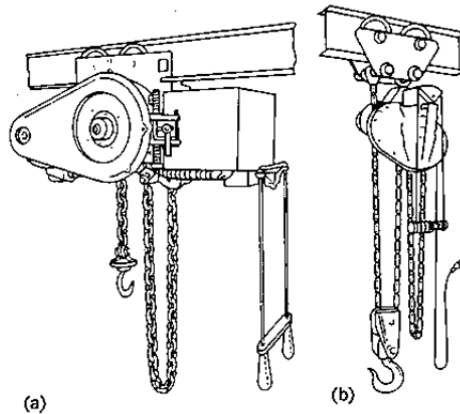


Figure 4. Hoists. (a) Chain. (b) Roller chain

Pneumatic or *air hoists* are constructed with cylinders and pistons for reciprocating motion and air motors for rotary motion. Both the motions are done with the help of compressed air. Pneumatically operated hoists provide smooth action and sensitive response to control.

There are a lot of below-the-hook attachments, such as slings, hooks, buckets, and highly specialized devices for practically any load-handling operations. Many of these devices are designed to pick up and release their loads automatically.

Comprehension check

7. Continue the phrases.

1. A winch is basically a drum or cylinder around which...
2. According to power source, hoists can be...
3. Block and tackle is a combination of...
4. Elevating machines move their loads only...
5. Heavy-duty hoists are standard equipment for...
6. Hoisting machines are mechanisms...

7. Large winches are equipped with...
8. The block and tackle is used where...
9. There are a lot of below-the-hook attachments, such as...

8. Insert the missing words.

1. A swivel hook, an eye, or similar device can be attached to...
2. According to ..., hoists can be hand, electric, or pneumatic.
3. Electric hoists are used for hoisting and hauling from ... locations in industrial plants and warehouses.
4. Hoisting machines are mechanisms that hold the material ... suspended.
5. Hoisting machines pick up loads at one location and deposit them at another anywhere within a ... area.
6. Heavy-duty hoists are ... moving heavy bulky loads.
7. Normally, ... are designed for stationary service.
8. Pneumatic (or air) hoists are constructed with ... for reciprocating motion and air motors for rotary motion.
9. The drum may be operated ... or by power.
10. The pulleys are ... that are used to change the direction of motion or application of force of the flexible member (rope or chain) that runs on the pulleys.

9. State whether the statements are true or false. Correct if necessary.

1. Block and tackle is a combination of a rope, cable or chain and independently rotating frictionless pulleys.
2. Heavy-duty types of hoists serve as the power units of power cranes and shovels.
3. In an air hoist cylinders and pistons are responsible for rotary motion.
4. Pneumatic hoists provide intermittent action.
5. The block and tackle is used as the hoisting tackle of derricks and cranes.
6. There are 3 principal components of hoisting machines.
7. There are 4 types of hoists.
8. Worm geared hoists are highly recommended where hoists are used frequently.

10. Answer the questions.

1. What is the hoisting machine?
2. What is the difference between hoisting and elevating machines?
3. What are the principal components of a hoisting machine?
4. The pulleys of the block and tackle are grooved or flat wheels, aren't they?
5. In what way do winches and hoists differ?
6. Where are winches used?
7. Hoists can be hand, electric, or pneumatic can't they?
8. Are hoists designed to lift from a position indirectly above their loads?
9. Are spur geared hoists powered manually or by electricity?
10. What below-the-hook attachment do you know?

Vocabulary practice

11. Skim the text. Find all verbs and *ing*-forms, denoting operations that hoisting machines do with loads (prompt: there are 11 words).

12. Complete the text using the words from the list below.

- | | | | |
|----------------------|-------------|----------------|----------|
| (a) block and tackle | (b) device | (c) manual | (d) hook |
| (e) rope (or cable) | (f) loads | (g) powered | |
| (h) moving | (i) mounted | (j) operations | |

The hoist is a mechanical (1) ... used primarily for raising and lowering heavy (2) ... but occasionally for (3) ... objects horizontally. It usually consists of a (4) ... – a combination of one or more fixed pulleys; a moving pulley with a (5) ... or other similar means of attaching loads; and a (6) ... between them. Motive power for a hoist may be either (7) ... or supplied by an electric motor. Electrically (8) ... hoists are commonly (9) ... to the floor or wall and are used for lifting and hauling (10) ... in factories and warehouses.

13. Complete the text translating the words in brackets.

A (1) ... (**лебёдка**) is a device that has a crank attached to a (2) ... (**барабан**) around which (3) ... (**трос, верёвка**) is wound. The rope is

attached to a (4) ... (грыз). By turning the crank, a person (5) ... (может) move the load to a desired position.

Note:

crank рукоятка

14. Match the words with their definitions.

(a) chain (b) ratchet (c) block and tackle
(d) lever (e) pulley (f) sprocket

1. A handle that you pull or push in order to make a machine etc. work.
2. A mechanical device that consists of a toothed wheel or bar that engage with a pawl that permits it to move in only one direction.
3. A series of usually metal rings that are joined together.
4. A thin wheel with teeth that engage with a chain.
5. A wheel or set of wheels that are used with a rope, chain etc., to lift or lower heavy objects.
6. A lifting mechanism consisting of ropes, a pulley block, and a hook.

Language focus

15. Match the synonyms.

1) engine; 2) lift; 3) cylinder; 4) pulley; 5) pull; 6) pneumatic;
7) operation; 8) heavy-duty; 9) plant; 10) gear; 11) fixed

a) air; b) job; c) equipment; d) hoist; e) motor; f) powerful; g) drum;
h) factory; i) haul; j) block; i) stationary

16. Match the antonyms.

1) intermittent; 2) flat; 3) horizontal; 4) manually; 5) pick up; 6) coil
a) smooth; b) by power; c) deposit; d) grooved; e) uncoil; f) vertical

17. Using the model form nouns from the following verbs and translate them.

Model: V + *ing* → N to raise – raising
To lower, to hoist, to haul, to handle, to pull.

Writing Practice

18. Translate the text in a written form. Mind how to translate the word 'one'.

Differential Hoist

Differential hoist, also known as endless chain, has one pulley in the lower block, to which the load is attached. The upper block has two pulleys of different sizes. These pulleys are joined so that they turn together. To raise the load, the upper pulleys are turned by pulling on the chain, leading from the larger pulley. As it turns, the larger pulley raises one of the chains that support the load. At the same time, the smaller pulley lowers the other chain. Because the pulleys differ in size, the larger one raises one chain more than the other chain. As the result of this difference, the load is raised.

Speaking practice

19. a. Work in pairs. Which directions can monorails, hoisting and elevating machines move their loads? Tick the boxes.

Direction	Hoisting machines	Elevating machines	Monorail
forwards and backwards			
up and down			
sideways			

b. Read the text. Check your answers.

Monorails can transport the load horizontally backwards and forwards; they can neither raise nor lower it. Elevating machines can work only vertically up and down. Hoisting machines can move the load forwards, backwards and sideways; they can also pick up and deposit the load vertically.

c. Complete the sentences with *can* or *can't*.

1. A monorail can transport loads horizontally, but ... raise or lower them.

2. An elevating machine ... move vertically, but it ... move horizontally.
3. Hoisting machines ... transport the load sideways, but elevating machines and monorails
4. Monorails ... raise and lower loads vertically, but hoisting and elevating machines

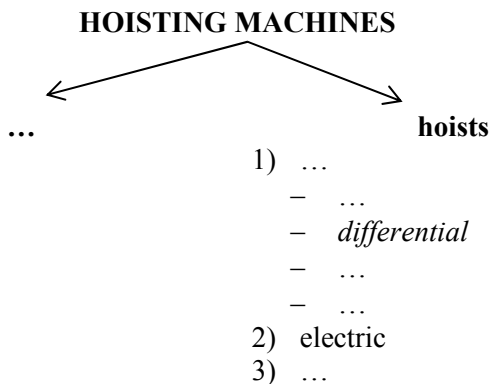
d. Work in pairs. Practise dialogues.

<i>hoisting machine(s)</i>	<i>move the load</i>	<i>forwards</i>
<i>elevating machine(s)</i>	<i>vertically</i>	<i>backwards</i>
<i>monorail(s)</i>	<i>horizontally</i>	<i>sideways</i>
<i>up and down</i>		

Model: A. Can a monorail move the load horizontally?
 B. Yes, it can.
 A. Can it move the load vertically?
 B. No, it' can't.

Summarizing

20. Fill in the diagram using the information from ex. 6. Speak on the types of hoisting machines. Use the words: *consist of, include, are divided into.*



21. Make up a plan of the text (ex. 6).

22. Make an abstract of the text (ex. 6).

23. Think and speak on:

- a) what a hoisting machine is;
- b) block and tackle;
- c) winches;
- d) hand hoists;
- e) electric and air hoists.

24. Discuss with your group mates or in pairs advantages and disadvantages of various types of hoists and winches.

UNIT 4 HOISTING MACHINES: CRANES

Pre-reading tasks

1. Study the terms:

a) elevator	лифт
bridge crane	мостовой кран
conveyor	конвейер
(power) crane	кран
derrick (-crane)	деррик(-кран)
gantry crane	портальный кран; козловой кран
full gantry crane	полный портальный кран
half-gantry crane	полупортальный кран
jib crane	стреловой кран
overhead travelling crane	подвижной портальный кран
pillar crane	мачтовый кран
truck crane	автокран
wall bracket crane	консольный кран (на буровой)
b) boom	стрела грузоподъёмного крана; вылет стрелы
jib	стрела (крана), укосина (крана)
cab	кабина управления
guy line	оттяжка, растяжка
mast	мачта
running gear	ходовая часть
end truck	ходовая тележка крана

2. Use the dictionary to translate the words:

to carry	to support
to pivot	to transfer
to rotate	to vary
to turn	to wind (wound, wound) (<i>around</i>)

3. Match the equivalents:

- | | |
|--------------------------------|---|
| 1) I-beam track | a) сыпучие материалы |
| 2) to span an area | b) двигатель внутреннего сгорания |
| 3) stiff legs | c) мост в виде сквозной фермы |
| 4) hand-propelled | d) кран, работающий без оператора |
| 5) pendant-type push-buttons | e) рельсовый путь в виде балки двутаврового сечения |
| 6) trusslike bridge | f) с ручным приводом |
| 7) usable movement | g) наклонная стрела |
| 8) ground level | h) уровень земли |
| 9) to pivot at one's lower end | i) эргономически выверенное движение |
| 10) load-supporting tackle | j) охватывать территорию |
| 11) bulk materials | k) жёсткая опора |
| 12) slanting boom | l) грузоподъёмное снаряжение |
| 13) an operationless crane | m) поворачиваться с опорой на нижний торец |
| 14) internal-combustion engine | n) подвесная кнопочная станция управления |

Reading task

4. Read the text carefully:

A *crane* is a hoisting machine that not only lifts heavy loads but also transfers them from one place to another usually over distances of not more than 60 meters. Cranes are distinct from hoists, passenger elevators, and other devices mostly for vertical lifting. They also differ from conveyors, which continuously lift or carry bulk materials such as grain or coal. Powered by manual or animal power, cranes have been in use from early times. But they have become widely applied only since the 19th century when steam engines, internal-combustion engines, and electric motors were introduced. Modern cranes vary in types and sizes. They may be powered by steam, electricity, diesel, or hydraulic power as well as by manual power.

A crane lifts a load by means of an attachment such as a hook, a bucket or a platform. A long arm called a boom moves the load about.

On most cranes, the attachment is connected to a block and tackle – it is a system of pulleys and a cable. The end of the cable winds around a winch. The winch turns and raises or lowers the load.

There are 3 large classes of cranes: derricks (or derrick cranes), jib cranes and bridge cranes.

A **derrick** has a mast in the form of a slanting boom that pivots at its lower end and carries load-supporting tackle at its outer end. In contrast, jib cranes always have horizontal booms.

Derrick masts are supported by guy lines or stiff legs. In some models the masts can rotate 360 degrees. Hand or powered winches (usually in conjunction with pulleys) do the lifting. Derricks are standard equipment on construction jobs. They are also used on freighters for loading and unloading cargo, and on barges for dredging operations.

Jib cranes with self-supporting masts are called *pillar cranes*. The jib cranes mounted on walls are called *wall bracket cranes*. Cranes with jib-like booms may have their own running gear or be mounted on trucks. Mobile types for heavier service are called *truck cranes*. They may or may not be able to rotate their booms.

Bridge cranes are hoisting machines in which the pulley system is suspended from a trolley that moves on tracks along one or two horizontal beams called the bridge. These cranes span a rather large area and differ among themselves in the construction of the bridge portion of the crane and in the method of suspension of the bridge. Overhead-travelling and gantry cranes are called bridge cranes.

In the *overhead-travelling cranes*, the bridge is carried by overhead trackage and moves along it. The trackage is usually fixed to the building structure itself. The *gantry crane* is normally supported by fixed structures. In other cases the gantry crane runs along tracks on ground level.

Gantry cranes are standard equipment in shipside operations. Basic arrangements of overhead-travelling cranes are top running and underhung. In the former case, the bridge's end trucks ride on top of the runway rails. In the latter, the end trucks carry the bridge suspended below the rails.

Where smaller areas are to be spanned, standard beams are used for the bridge structure. For larger spans built-up girders or truss-like bridge structure are used. Supporting elements of a *full gantry crane* are both on the ground and usually ride on tracks. In the case of a *half-gantry crane* (sometimes called semi gantry) only one of the supporting structures of the bridge stands on the ground. The other runs directly along

overhead tracks. Selection of type of a gantry crane depends on building design and the areas in which the crane will be used.

Hoists may be attached to the bridge. Usually they suspend from a trolley that is attached to an I-beam track. The combination of a hoist on a track and the bridge crane moving on tracks provides for usable movement of equipment within a rectangular area governed only by the length of the bridge and the total horizontal movement of the bridge crane.

In simpler cranes the bridges and trolley hoists may be hand-propelled. In heavy-duty ones separate electric motors drive each motion. Controls for the motors vary from pendant-type push buttons (operated from the ground) to remote or automatic control. Pendant controls are satisfactory when a crane has intermittent use during the work day. In larger units, where the crane is in constant use and heavy loads are the rule, an operator may be stationed in a cab mounted to the bridge structure. A more sophisticated extension of this is the operatorless crane. It is worked by means of an electronic control.

Note:

shipside

вдоль борта корабля

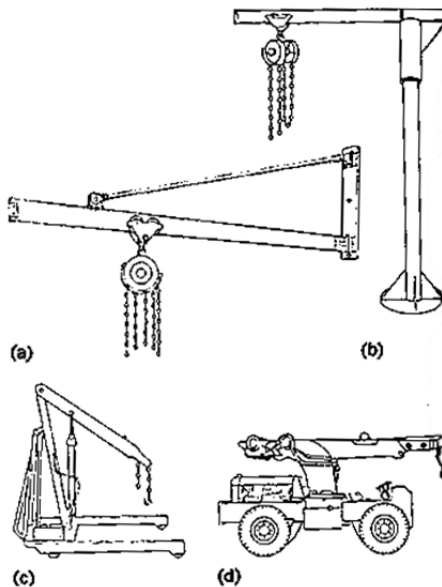


Figure 1. Four types of jib cranes. (a) Wall crane. (b) Pillar crane. (c) Movable hydraulic crane. (d) Truck crane

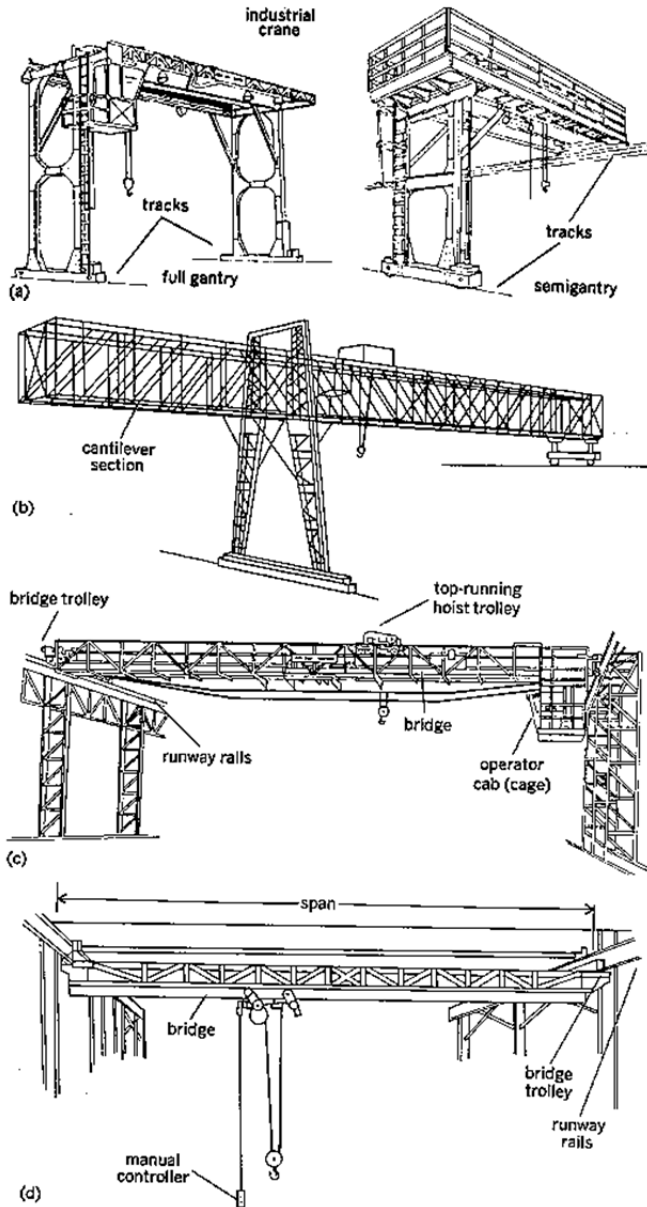


Figure 2. Basic types of overhead-travelling cranes. (a) travelling gantry cranes. (b) Cantilever crane. (c) Top-running crane. (d) underhung crane

Comprehension check

5. Continue the phrases:

1. A crane lifts a load by means of...
2. Cranes are distinct from...
3. Derrick masts are supported by...
4. Modern cranes may be powered by...
5. Modern cranes vary in...
6. On most cranes, the attachment is connected to...
7. Overhead-travelling and gantry cranes are called...
8. The gantry crane is normally supported by...
9. The jib cranes mounted on walls are called...
10. The operatorless crane is worked by means of...

6. Insert the missing words.

1. ... types for heavier service are called truck cranes.
2. A long arm called ... moves the load about.
3. Basic arrangements of ... are top running and underhung.
4. Derricks are ... equipment on construction jobs.
5. For larger spans ... are used.
6. Gantry cranes are ... in shipside operations.
7. Jib cranes with ... are called pillar cranes.
8. Powered ..., cranes have been in use from early times.
9. Usually hoists suspend from a trolley ... an I-beam track.
10. Where smaller areas are to be spanned, ... are used for the bridge structure.

7. State whether the statements are true or false. Correct if necessary.

1. A half-gantry crane is sometimes called a semi gantry crane.
2. A pillar crane is a jib crane with a self-supporting mast.
3. Bridge cranes are hoisting machines in which the trolley is suspended from a pulley system.
4. Cranes are elevating machines that lift heavy loads and transfer them from one place to another.
5. Cranes were not used until the 19th century.

6. Gantry cranes are standard equipment in shipside operations.
7. Jib masts are supported by guy lines or stiff legs.
8. Overhead-travelling, gantry and jib cranes are called bridge cranes.
9. Selection of type of a gantry crane depends on building design and the areas in which the crane will be used.
10. The operatorless crane is worked by means of a remote control.

8. Answer the questions.

1. What is a crane?
2. What are the differences between cranes and other hoisting and elevating machines?
3. When did cranes become widely used?
4. What types of cranes do you know?
5. Where are derricks used?
6. Are mobile cranes called truck cranes or track cranes?
7. All mobile cranes can rotate their booms, can't they?
8. Is the bridge of a crane a horizontal or vertical beam?
9. A heavy-duty crane has got one motor for all motions, hasn't it?
10. How can heavy-duty cranes be controlled?

Vocabulary practice

9. Match the equipment with its name:



(a)



(b)



(c)



(d)



(e)



(f)



(g)

- 1) derrick crane
- 2) pillar crane
- 3) wall bracket crane
- 4) truck crane
- 5) overhead-travelling crane
- 6) full gantry crane
- 7) half gantry crane

10. Complete the text using the words from the list below.

- | | | | |
|------------|---------------|-------------|------------|
| (a) gantry | (b) crawler | (c) tracks | (d) bridge |
| (e) span | (f) pulleys | (g) trolley | (h) wheels |
| (i) lift | (j) guy lines | | |

Cranes have a long reach and can (1) ... loads to great heights. The overhead travelling crane, a type of a (2) ... crane, is used inside buildings or in outdoor storage yards. Two or more parallel girders (3) ... its working area. Another girder, called the bridge, stretches between them and rolls along them on (4) This girder, in turn, supports a (5) ... from which a lifting attachment is lowered by (6) The (7) ... crane, another type of bridge crane, has a bridge supported by vertical structures that move along (8) The derrick is a crane equipped either with a vertical mast as on barges, or with (9) ... , as in building construction. A (10) ... crane is a self-propelled crane that moves on caterpillar treads.

Note:

outdoor storage yards

склады открытого хранения

11. Match the words with their definitions.

- | | | |
|---------------|-------------------|-----------|
| (a) escalator | (b) conveyor | (c) hoist |
| (d) crane | (e) elevator/lift | |

1. A machine in a tall building that is used for carrying people or goods from one floor to another.
2. A moving staircase in a shop, etc.
3. A continuous moving belt that carries objects from one place to another, for example in a factory.

4. A machine for raising and lowering goods or personnel by means of a cable.
5. A large machine with a long metal arm that is used for moving or lifting heavy objects.

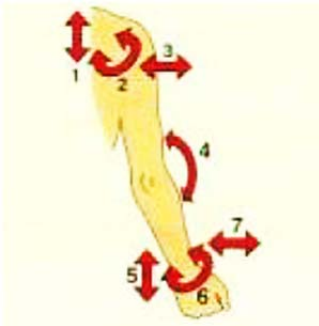
12. a. Work in pairs. Follow the instructions and answer the questions.

Close your fist and hold your arm out straight in front of you.

1. Think of your wrist (don't move it). How many directions can it move it? One, two, three or four?
2. Think of your shoulder. (don't move it). How many directions can it move it? One, two, three or four?
3. Think of your elbow (don't move it). How many directions can it move it? One, two, three or four?

b. Read the text. Check your answers.

The human arm can move in seven different directions. The arm has three pivots: the wrist, the elbow and the shoulder. The wrist can move



in three different directions. At the wrist, the hand can move up and down about 90°, it can move from side to side about 70°, and it can rotate about 180°. The shoulder can move in the same three directions, but at different angles. It can rotate about 20°. The elbow can only move in one direction. At the elbow, the forearm can only move up and down. It cannot move sideways or rotate.

c. Match each movement in the diagram above with a word or phrase.

(a) rotate

(b) move sideways

(c) move up and down

Writing practice

13. a. Read some more facts about cranes. Try to get the main idea.

Unusual cranes

Aerial cranes are usually attached to helicopters to lift large loads. Helicopters can lift loads and travel them to areas that are difficult for a conventional crane to reach. Helicopter cranes are more usually used to lift loads onto shopping centres, high-rise buildings, skyscrapers, etc. However, they can raise basically anything within their lifting capacity – cars, boats, swimming pools, for example. They also work as disaster relief after natural disaster for clean-up. During wildfires such cranes are able to carry huge buckets of water over fires to put them out. *Sikorsky S-64 Skycrane* and *Mi-26* are examples of flying cranes.

Floating cranes are used mainly in bridge building and port construction, but they are also used for loading and unloading especially heavy or bulky loads on and off ships. Some floating cranes are mounted on a pontoon. Others are specialized crane barges with lifting capacity over 10,000 tons and are used to transport entire bridge sections. Floating cranes have also been used to salvage sunken ships. The *Thialf* is the largest floating crane in the world: it can lift 14,200 tons.

Note:

conventional	обычный, традиционный
disaster relief	помощь в бедствии
pontoon	понтон
to salvage sunken ships	спасать затонувшие корабли

b. Write a short paragraph summarizing it.

Language focus

14. Match the synonyms.

1) lift; 2) work; 3) half; 4) hand-propelled; 5) bucket; 6) rotate;
7) tracks; 8) beam; 9) jib; 10) motor; 11) load

a) girder; b) rails; c) grab; d) semi; e) operate; f) engine; g) pivot;
h) hoist; i) boom; j) by manual power; k) weight

15. Match the antonyms.

1) top running; 2) below; 3) large; 4) the latter; 5) fixed; 6) load; 7) raise

a) the former; b) unload; c) lower; d) underhung; e) small; f) over; g) movable

16. State the part of speech of the following words and translate them.

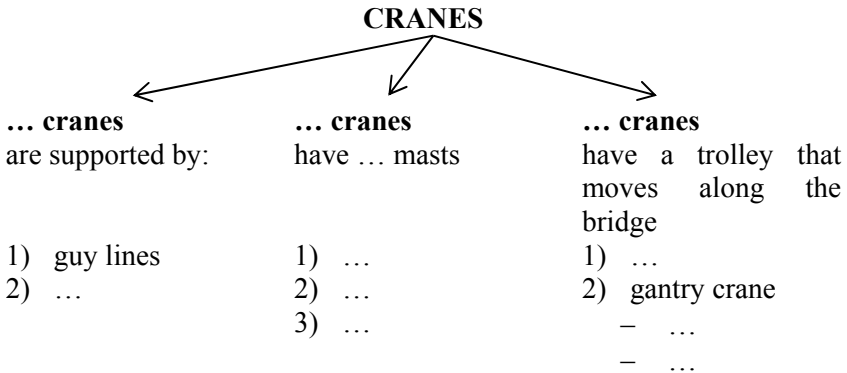
high – highly/high –heighten – height
wide – widely – widen – width
deep – deeply– deepen – depth
long – long – lengthen – length
short – shortly – shorten – shortness
smooth – smoothly – smoothen – smoothness

17. Give the initial forms of the words and translate them.

Hand-propelled, operatorless, truss-like, running, larger, trackage, jib-like, lifting, self-supporting, satisfactory, height, heavier.

Summarizing

18. Fill in the diagram using the information from ex. 4. Speak on the types of cranes. Use the words: *consist of, include, are divided into.*



19. Make up a plan of the text (ex. 4).

20. Make an abstract of the text (ex. 4).

21. Think and speak on:

- a) what a crane is;
- b) derrick cranes;
- c) jib cranes;
- d) overhead travelling cranes;
- e) gantry cranes;
- f) types of crane control.

22. Discuss with your group mates or in pairs advantages and disadvantages of various types of cranes.

UNIT 5
ELEVATING MACHINES: INDUSTRIAL LIFTS, STACKERS
AND FREIGHT ELEVATORS

Pre-reading tasks

1. Study the terms.

a) industrial lift	промышленный подъёмник
stacker	штабелёр
tiering machine	штабелеукладчик
dumbwaiter	малый грузовой лифт
lifting tail gate	грузоподъёмный задний борт
freight elevator	грузовой лифт
portable elevator	передвижной подъёмник
hydraulic elevator	гидравлический лифт
special-purpose freight-handling elevator	грузовой лифт специального назначения
b) loading ramp	аппарель
floor leveler	выравнивающее устройство
hinged frame	шарнирная рама
roller	ролик
caster	самоориентирующееся колесо
power takeoff	механизм отбора мощности
hand lever	рычаг управления
transmission	коробка передач
storage battery	аккумуляторная батарея
frame	рама
carriage	каретка

2. Use the dictionary to translate the words.

merchandise	to dump	to equip (<i>with</i>)
to actuate	to effect	to guide
to adapt (<i>to</i>)	to employ	to install
to bolt (<i>with</i>)		

3. Match the equivalents.

- | | |
|--------------------------------|---|
| 1) battery-operated | a) строительная площадка |
| 2) bed of the carrier | b) обработка грузов |
| 3) die handling | c) подъёмное устройство |
| 4) freight handling | d) складской стеллаж |
| 5) lifting device | e) подъёмно-транспортная машина |
| 6) storage rack | f) приводится в движение мотором |
| 7) construction site | g) работающий от аккумуляторной батареи |
| 8) to be driven by a motor | h) вертикальная траектория движения |
| 9) vertical path of travel | i) платформа транспортного средства |
| 10) materials-handling machine | j) управление штампами и пресс-формами |

Reading task

4. Read the text carefully.

Elevating machines are materials-handling machines that lift and lower a load along a fixed vertical path of travel with intermittent motion. In contrast to hoisting machines, elevating machines support their loads instead of carrying them suspended, and the path they travel is both fixed and vertical. They differ from vertical conveyors because they move intermittently rather than continuously. **Industrial lifts, stackers,** and **elevators** are the principal classes of elevating machines.

Industrial lifts. A wide range of mechanically, hydraulically, and electrically powered machines are classified simply as **lifts**. They are adapted to die handling and feeding sheets, bar stock, or lumber. In some locations with differences in floor level between adjacent buildings, lifts look like broad platforms and serve as floor levelers. In such cases ramps are not needed. They are also used to raise and lower loads between the ground and the beds of carriers when there is no loading platform. **Lifting tail gates** attached to the rear of trucks are also used for loading or unloading merchandise on sidewalks or roads and at points where loading or unloading is difficult without a raised platform. Lifting tail

gates are usually driven by battery-operated motors on a power take off from the transmission of the vehicle.

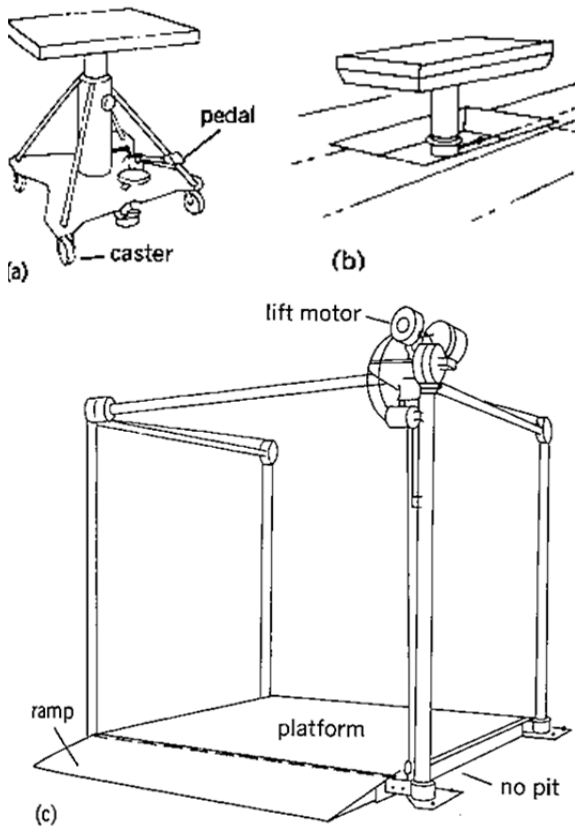


Figure 1. Examples of industrial lifts. (a) Hydraulic elevating work table. (b) Hydraulic lift floor leveler. (c) Motor-driven floor leveler

Stackers. *Tiering machines* and *portable elevators* are used for stacking merchandise. They are basically portable vertical frames that support and guide the carriage, to which a platform, pair of forks, or other suitable lifting device is attached. The carriage can be raised and lowered by hand, by an electrically driven winch, or by a hydraulic cylinder, which actuates the system of chains or cables. This system can be operated by hand lever, pedal, or push button. Modern models of stackers

are powered by storage batteries or by small gasoline or gas engines. Horizontal movement is effected by casters on the bottom of the vertical frame. These casters usually have floor locks which are used during the elevating or lowering operation.

The basic type of stackers varies in several ways. Masts, which are part of the frame, can be hinged or telescopic. The platforms can be plain, equipped with rollers, or constructed specially to handle a specific product. Some stackers have devices for tilting barrels and drums or for lifting and dumping free-flowing bulk materials. Used in conjunction with cranes, stackers are widely applied to the handling of materials on storage racks. Stackers have a significant place in the development of materials-handling equipment. They are the prototypes of fork-lift trucks and some other devices.

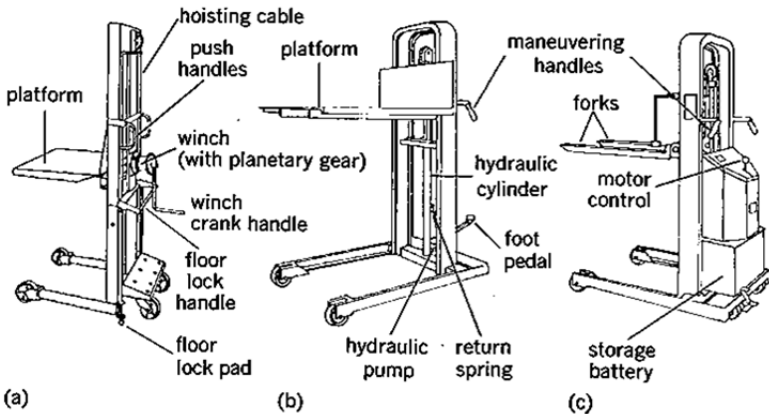


Figure 2. Three types of electric and hydraulic stackers. (a) Hand stacker. (b) Hydraulic foot stacker. (c) Electric lift stacker

The most common and economical elevator consist of electric motors, cables, pulleys, and counterweights. Elevator platforms and structures impact loading. That is why designs of freight elevators and constructions provide greatly increased strength in comparison with passenger elevators.

Freight (industrial) elevators. Examples of industrial elevators vary from those that are set up temporarily on construction sites for moving materials and personnel between floors to permanent installations for merchandise handling in factories and warehouses.

Dumbwaiters are a type of industrial elevator. They have capacities up to 500 lb (227 kg) and a maximum floor space of 0.8 square meters. Dumbwaiters carry parts, small tools, samples, and similar small objects, but are not permitted to carry people.

Hydraulic plunger elevators are designed for low-rise freight handling. They can be installed without special building alterations, but only into buildings with just a few floors because of the limitations of the plunger length and design.

Special-purpose freight-handling elevators are equipped with platforms or arms for carrying specific articles such as rolls of paper, barrels, or drums. Some of these elevators load and discharge automatically and they can operate at any selected floor by means of remote control.

Note:

feed

подавать

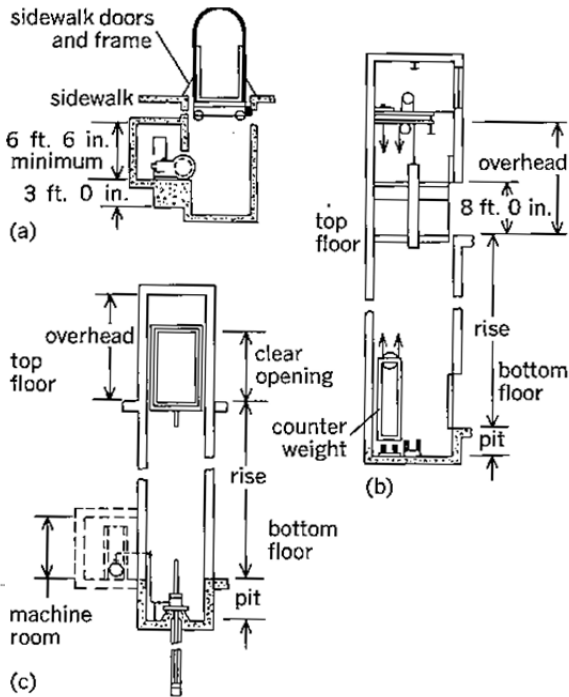


Figure 3. Three types of industrial elevator. (a) Side-walk elevator. (b) Heavy-duty freight elevator. (c) Hydraulic electric elevator

Comprehension check

5. Continue the phrases.

1. Designs of freight elevators and constructions provide greatly increased ruggedness in comparison with...
2. Dumbwaiters carry...
3. Elevating machines are materials-handling machines that...
4. Lifting tail gates are also used for...
5. Lifts look like...
6. Modern models of stackers are powered by...
7. Oil hydraulic plunger electric elevators can be installed only into buildings with just a few floors because of...
8. Special-purpose freight-handling elevators are equipped with...
9. The carriage can be raised and lowered by...
10. Tying machines and portable elevators are used for...

6. Insert the missing words.

1. ... are a type of industrial elevator.
2. ... types for heavier service are called truck cranes.
3. Masts, which are part of the ... , can be hinged or telescopic.
4. Modern models of stackers ... by storage batteries or by small gasoline or gas engines.
5. Oil hydraulic plunger electric elevators can be ... without special building alterations.
6. Some special-purpose freight-handling elevators load and ... automatically.
7. Some stackers have devices for lifting and dumping ... materials.
8. Stackers are the prototypes of ... and some other devices.
9. The ... can be plain, equipped with rollers, or constructed specially to handle a specific product.
10. Tying machines and portable elevators are basically ... frames that support and guide the carriage.

7. State whether the statements are true or false. Correct if necessary.

1. A dumbwaiter is a type of an industrial lift.
2. Casters on the bottom of the vertical frame effect horizontal movement.
3. Dumbwaiters are used for stacking merchandise.
4. Floor levelers look like broad platforms.
5. Fork-lifts are prototypes of stackers.
6. Hydraulic elevators are designed only for low-rise freight handling.
7. Hydraulic elevators can be installed into high-rise buildings.
8. Some industrial elevators are permanent installations for merchandise handling in factories and warehouses.
9. Stackers are portable vertical frames with a lifting device attached to the carriage.
10. Stackers have a significant place in the development of materials-handling equipment.

8. Answer the questions.

1. What is an elevating machine?
2. In what way do elevating machines differ from hoisting machines?
From vertical conveyors?
3. What types of elevating machines do you know?
4. Are industrial lifts used instead of ramps or cranes?
5. A lifting tail gate is attached to the front of a truck, isn't it?
6. What are tiering machines and portable elevators used for?
7. Are stackers the prototypes of fork-lift trucks or freight elevators?
8. What types of freight elevators do you know?
9. People are not permitted to take the dumbwaiter, are they?
10. What is the main difference in design between passenger and freight elevators?

Vocabulary practice

9. Match the equipment with its name.



(a)



(b)



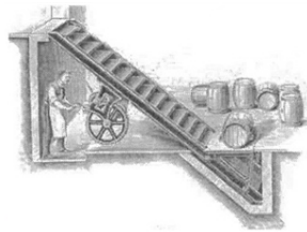
(c)



(d)



(e)



(f)



(g)

- 1) industrial lift
- 2) lifting tail gate
- 3) tiering machine
- 4) portable elevator
- 5) dumbwaiter
- 6) freight elevator
- 7) special-purpose freight-handling elevator (inclined)

10. Complete the text translating the words in brackets.

The Roman architect Vitruvius wrote that Archimedes had built his first (1) ... (лифт) probably in 236 BC. Later elevators were mentioned as cabs (кабины) on a rope and (2) ... (приводимые в движение) by hand or by animals.

In 1000 an Islamic book described the use of an elevator-like (3) ... (подъёмное устройство) in order to (4) ... (поднять) a large battering ram to destroy a fortress. In the 17th century the (5) ... (прототипы) of elevators were located in palaces of England and France. King Louis XV of France ordered to build a so-called 'flying chair' for one of his mistresses.

Ancient and medieval elevators used drive systems based on hoists or (6) ... (лебёдки). The invention of a system based on the screw drive was perhaps the most important step in elevator technology since ancient times. It led to the creation of modern (7) ... (пассажирские лифты). The first screw drive elevator was built by Ivan Kulibin and (8) ... (был установлен) in Winter Palace in 1793.

Note:

battering ram	стенобитное орудие
drive systems	системы передач
screw drive	передача винт-гайка
screw drive elevator	винтовой лифт

11. a. Complete the text with the correct motion words.



(a) linear



(b) reciprocating



(c) oscillating



(d) rotary



(e) clockwise



(f) anticlockwise

There are four basic motions. First, there is (1) ... motion. This is movement in a straight line, and in one direction. Secondly, there is (2) ... motion, which is two-way movement backwards and forwards or up and down (like a piston) in a straight line. The third type is (3) ... motion, which swings from side to side (like a pendulum). Finally, there is (4) ... motion, which is a motion in a circular direction, like a shaft of a wind turbine. It can be (5) ... and (6)

b. Complete the sentences. Use the present simple of the verbs.

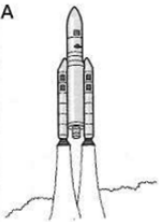
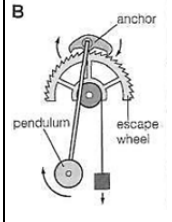
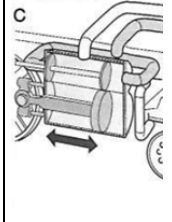

(a) *oscillate*

(b) *reciprocate*

(c) *rotate*

1. Propeller shaft ...
2. A car engine piston
3. Pendulums ...
4. Hands of a clock never ... anticlockwise.
5. When you tighten a screw, it ... clockwise.

c. Complete the table.

	A	B	C	D
				
Type of motion	linear			
How it moves				rotates
Examples of machines			pistons	

Language focus

12. Match the synonyms.

1) operate; 2) caster; 3) loading platform; 4) plunger; 5) carrier;
6) freight elevator

a) industrial elevator; b) wheel; c) ramp; d) piston; e) vehicle;
f) cylinder

13. Match the antonyms.

1) permanent; 2) freight elevator; 3) with; 4) raise; 5) modern; 6) load
a) passenger elevator; b) lower; c) ancient; d) temporary; e) without;
f) discharge

14. Using the model form nouns from the following verbs and translate them.

Model: V → N to raise – raise

Path, stack, lock, design, roll, load.

15. Read the following words paying attention to the stress and translate them.

transport (n) – to transport
 increase (n) – to increase
 export (n) – to export

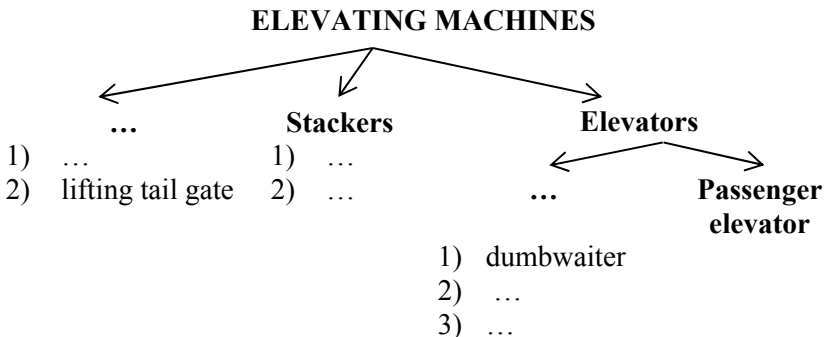
import (n) – to import
 subject (n) – to subject
 project (n) – to project

16. Derive adjectives from the adverbs and translate them.

Mechanically, hydraulically, electrically, automatically, basically, continuously, friendly, specially, easily.

Summarizing

17. Fill in the diagram using the information from ex. 4. Speak on the types of elevating machines. Use the words: *consist of, include, are divided into, fall into.*



18. Make up a plan of the text (ex. 4).

19. Make an abstract of the text (ex. 4).

20. Think and speak on:

- a) what an elevating machine is;
- b) industrial lifts;
- c) stackers;
- d) freight elevators.

21. Discuss with your group mates or in pairs the role of elevating machines in industrialization.

UNIT 6
ELEVATING MACHINES: PASSENGER ELEVATOR

Pre-reading tasks

1. Study the terms.

- | | |
|----------------------------|--|
| a) elevator shaft | шахта лифта |
| hoistway | шахта лифта |
| pit | приямok лифта |
| car | кабина лифта |
| counterweight | противовес |
| landing | посадочная площадка |
| driving machine | силовая установка |
| gearless traction elevator | электрический лифт с безредукторной лебёдкой |
| geared traction elevator | электрический лифт с редукторной лебёдкой |
| b) control device | механизм управления |
| speed-sensing device | датчик скорости |
| governor | ограничитель скорости |
| clamping device | стопорное устройство |
| safety | ловитель |
| guide rail | направляющая |
| tension sheave | шкив натяжного устройства |
| hoist rope | тяговый канат |
| governor rope | канат ограничителя скорости |
| guide shoe | направляющий башмак |
| guide roller | направляющий ролик |
| governor sheave | шкив ограничителя скорости |
| hoisting sheave | канатоведущий шкив |
| drive sheave | канатоведущий шкив |
| c) control circuit | электросхема управления |
| sensor | датчик |
| switch | выключатель |
| controller | контроллер |

gear reduction unit	редуктор с зубчатой передачей
electric pump	электронасос
valve	клапан
plunger	плунжер
high-speed motor	высокоскоростной электродвигатель
slow-speed motor	низкоскоростной электродвигатель

2. Use the dictionary to translate the words.

ascent	to grip	to ride
descent	to offset	to slide
freight	to overspeed	to travel
to detect	to rest	to trip

3. Match the equivalents.

- | | |
|-----------------------------------|--|
| 1) releveling | a) потребление энергии |
| 2) door operation | b) кнопки для слепых |
| 3) the sight-impaired | c) диагностика системы |
| 4) energy consumption | d) инвалиды по зрению |
| 5) system diagnostics | e) управление дверями |
| 6) flight time | f) существующие сценарии движения внутри здания |
| 7) passenger waiting time | g) время ожидания пассажиром (лифта) |
| 8) Braille buttons | h) время, затраченное на поездку в лифте |
| 9) past building traffic patterns | i) выравнивание кабины относительно пола посадочной площадки |

Reading task

4. Read the text carefully.

An *elevator* is a platform that is raised and lowered in a vertical hoist way to transport freight or people.

Operation. The closed passenger car of a modern elevator rests inside a steel frame. The car and the car frame ride up and down on steel rails in an elevator shaft or a hoistway. Guide shoes or rollers on the frame keep the car in place on the rails. Most elevators also have a heavy weight, called a counterweight, attached to the other end of the steel hoisting ropes that pass over the driving machine pulley. The counterweight offsets much of the weight of the car and passengers, and so reduces power requirements.

Control devices. The typical elevator control system is made up of a speed-sensing device known as a **governor**; a **clamping device (safety)** mounted under each end of the car frame that grips the guide rail; a **tension sheave** in the pit, and a **steel rope**. The governor rope makes a complete loop around the governor sheave and the tension sheave in the pit. As the rope is fastened to the car and travels with it, the governor sheave rotates at a speed directly proportional to the speed of the car.

The governor rope is connected to the safeties. If the hoist ropes break or the car overspeeds, the governor trips and releases a device that grips the governor rope. If the car continues its descent, the pull of the rope on the operating lever sets the safety. The safety, in turn, applies sufficient force against the guide rail to bring the car to a controlled stop with frictional force.

Control devices are also built into the door and its control circuit. When the doors open, control circuits prevent the car from moving away from the landing, but permit relevelling if the car moves when passengers enter or leave the elevator (load changes). Sensors mounted on the doors detect objects in the path of the moving doors and make them reopen. In some models passengers themselves have to activate a switch to reopen the doors.

Elevator controller. Sophisticated elevator controllers began to replace human elevator operators in the 1950s. In modern elevators, microprocessor computer systems control elevator position, direction of travel, speed, door operation, passenger waiting time, flight time, energy consumption, and system diagnostics.

Systems are being developed that learn from past building traffic patterns and predict future patterns, assigning elevator cars to destinations in advance of actual demand and reducing passenger waiting time. Besides, in the future elevators will be equipped with laser devices that

scan a floor for waiting passengers and signal the elevator accordingly to stop or continue. Modern elevators include Braille buttons and voice announcements of the floors to help the sight-impaired.

Types. There are three major types of elevators: gearless traction, geared traction, and hydraulic.

Gearless traction elevators are used in high-rise buildings over 10–12 stories, and travel at speeds from 400 to 2000 ft/min (120 to 610 m/min). They use large, slow-speed electric motors directly connected to a large, grooved drive sheave (pulley). The ‘hoist ropes’ (steel cables) are attached at one end to the top of the elevator car. They pass over the drive sheave and are attached at the other end to a counterweight that slides up and down the shaft on its own guide rails. The full weight of the car and about half of its passenger load is balanced by the counterweight, which goes down as the car moves up. Thus, the electric motor does not have to lift the full weight of the car.

The main difference between geared and gearless traction elevators is speed. A ***geared elevator*** usually travels at speeds from 25 to 450 ft/min (8 to 140 m/min), carries loads up to 30,000 lb (13,500 kg) or more. It uses a high-speed motor to drive the hoisting sheave through a gear reduction unit.

Hydraulic elevators are used extensively in low-rise buildings, usually up to five stories. With speeds rarely exceeding 150 ft/min (46 m/min), the hydraulic elevator does not need overhead hoisting machinery. The elevator is mounted on a piston inside a cylinder that extends into the ground to a depth equal to the height the elevator will rise. Relatively simple in design, the system uses an electric pump to force oil into the cylinder to give the elevator a controlled ascent. Electrically controlled valves release the oil for a controlled descent.

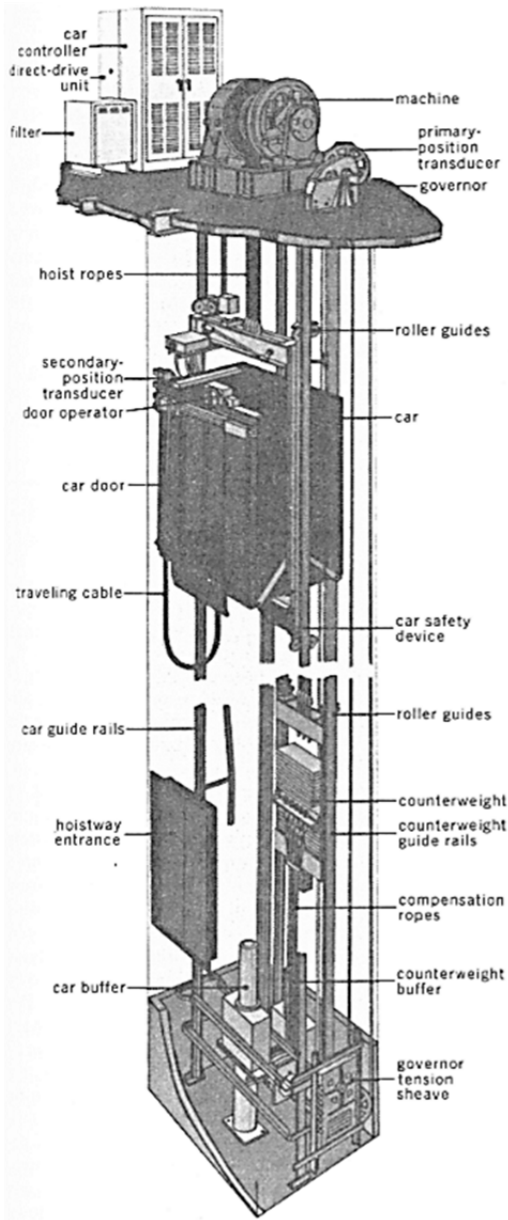


Figure 1. Typical installation of a traction elevator

Comprehension check

5. Continue the phrases.

1. An elevator is...
2. Control circuits permit...
3. Control devices are also built into...
4. Guide shoes or rollers on the frame keep...
5. In the future elevators will be equipped with...
6. Sophisticated elevator controllers began to replace human elevator operators in...
7. The governor rope is connected to...
8. The principal difference between geared and gearless traction elevators is...
9. The typical elevator control system is made up of...
10. There are three major types of elevators...

6. Insert the missing words.

1. ... is connected to the safeties.
2. ... prevent the car from moving away from the landing.
3. ... release the oil for a controlled descent.
4. A geared elevator uses a ... to drive the hoisting sheave through a gear reduction unit.
5. Control circuits prevent the car from
6. Hydraulic elevators are used extensively ... , usually up to five stories.
7. Modern elevators include ... to help the sight-impaired.
8. Most elevators also have a ... attached to the other end of the steel hoisting ropes.
9. The closed passenger car of a modern elevator rests ... a steel frame.
10. The full weight of the car and about half of its passenger load is balanced by ... , which goes down as the car moves up.

7. State whether the statements are true or false. Correct if necessary.

1. There is no difference between geared and gearless traction elevators.

2. The governor is a clamping device mounted under each end of the car frame
3. Hydraulic elevators are used in low-rise buildings.
4. Geared traction elevators use slow-speed motors.
5. Gearless traction elevators are faster than geared elevators.
6. Elevator controllers began to replace human elevator operators in the 1850s.
7. The electric motor has to lift the full weight of the car.
8. Sensors mounted under the doors detect objects in the path of the moving doors and make them reopen.
9. In all models passengers themselves have to activate a switch that causes reversal of door movement.
10. The counterweight reduces power requirements.

8. Answer the questions.

1. What is the elevator used for?
2. What types of the elevator do you know?
3. What are the main parts of an elevator?
4. How does the counterweight reduce power requirements?
5. What control devices are used in modern elevators?
6. Are control devices usually built into the door or into the landing?
7. What are control circuits used for?
8. Is it easy for the sight-impaired to use modern elevators?
9. What do microprocessor computer systems control in modern elevators?
10. What is the principal difference between geared and gearless traction elevators?

9. a. Match the parts with their functions.

- | | |
|------------------------|--------------------------------------|
| 1) car | a) runs between vertical guide rails |
| 2) car buffer | b) absorbs the impact of any fall |
| 3) counterweight | c) support the car |
| 4) door sensors | d) help the sight-impaired |
| 5) governor | e) controls the speed of the car |
| 6) elevator controller | f) controls lifts |
| 7) safety | g) locks the car |

- 8) steel cables
- 9) braille buttons and voice announcements
- h) matches the weight of a car with passengers
- i) ensure that no passenger can be injured or fall down an open shaft

b. Make sentences from the parts and functions.

Vocabulary practice

10. Complete the text using the words from the list below.

- (a) counterweight (b) car (c) freight (d) propelled
 (e) high-rise (f) shaft (g) cities (h) impaired
 (i) cables and pulleys

The elevator is a (1) ... that moves in a vertical (2) It carries passengers or (3) ... between the levels of a multi-story building. Most modern elevators are (4) ... by electric motors, with the help of a (5) ... , through a system of (6) The elevator played a great role in creating the characteristic urban geography of many modern (7) ... , especially in the United States. (8) ... cities like New York absolutely depend on elevators. Elevators make offices and apartments accessible to (9) ... people.

11. Match the words with their definitions.

- (a) elevator operator (b) laser device (c) valve
 (d) counterweight (e) sensor (f) car

1. A device that detects or senses heat, light, sound, motion, etc., and then reacts to it in a particular way.
2. A device that produces an intense beam of light (used for cutting, melting, etc.).
3. A mechanical device that controls the flow of a liquid.
4. A passenger compartment of an elevator.
5. A person who operates a manually operated elevator.
6. A weight that provides a balance against something of equal weight.

Language focus

12. Match the synonyms.

1) offset; 2) rope; 3) detect; 4) hoistway; 5) load; 6) move up;
7) high-rise building; 8) move

a) cable; b) balance; c) freight; d) find; e) skyscraper; f) rise;
g) elevator shaft; h) go/ride/travel

13. Match the antonyms.

1) descent; 2) slow-speed; 3) low-rise; 4) prevent; 5) up; 6) enter;
7) counterweight

a) weight; b) high-rise; c) permit; d) leave; e) ascent; f) high-speed;
g) down

14. Read and translate the following words paying attention to the prefix *re-*, which means ‘снова, заново, ещё раз, обратно’.

open – открывать; reopen – ...

level – ровнять; relevel – ...

place – ставить; replace – ...

move – двигать; remove – ...

construct – строить; reconstruct – ...

write – писать; rewrite – ...

make – делать; remake – ...

paint – красить; repaint – ...

15. Form the nouns from the following verbs using suffixes *-er* or *-or* and translate them.

To roll, to elevate, to govern, to control, to operate, to sense, to make, to process.

16. Find the agent nouns for the verbs. Use a dictionary if necessary. Use these nouns to fill in the blanks.

(a) calculate

(b) conduct

(c) contain

(d) receive

(e) generate

(f) stabilise

(g) transmit

1. The number pad on a computer can be used as a
2. Your body can act as a ... of electricity in a thunderstorm.
3. Your car engine functions as a ... when it recharges the battery.
4. The antenna on a mobile phone operates as a ... and as a ... of radio signals.
5. The tools arrived at the port in a cargo
6. A pair of small supporting wheels on either side of the rear wheel act as ...s in a child's bicycle.

Reading Practice

17. Read the text and choose the right statements.

Elisha Graves Otis (1811-1861) was an American inventor. He was born in Halifax (Vermont, USA). In 1852, while working as a master mechanic in a mattress factory in Yonkers (New York), he invented and installed the first elevator equipped with an automatic safety brake. Fear that elevator cables could break had been the major argument against the use of suspended elevators. Otis' invention helped remove opposition to them. In 1853, Otis founded a company to manufacture elevators with the new safety device.

Otis demonstrated his automatic brake at the Crystal Palace in New York in 1854. He proved the effectiveness of his brake in preventing falls very dramatically. While the inventor was rising in one of his elevators, the cable was cut, but the elevator did not fall. This demonstration attracted much attention, and Otis in 1857, installed the first elevator exclusively for passenger use.

In 1861, Otis patented a steam-driven elevator. This secured the success of his firm, and the Otis Elevator Company became a leader in the field. Otis' safety elevator contributed to the increased popularity of multistory buildings after the Civil War in the USA, and the company prospered, even after Otis' death.

In 1887 the Otis Company won the contract for the elevators to the second level of the Eiffel Tower after French firms had refused the project because of its complexity. These elevators were among the favourite exhibits at the 1889 Paris Exposition and won the company the worldwide fame.



Picture 1. Elisha Otis demonstrating his safety system, Crystal Palace (1854)

Elisha Otis invented...

- a) the safety brake;
- b) the multistory building;
- c) the Eiffel Tower;
- d) the steam-driven elevator;
- e) the passenger elevator.

Speaking practice

18. Work in pairs. Make questions and answers, using the words from ex. 9.

A: Does a car buffer ensure that no passenger can be injured or fall down an open shaft?

B: No, it doesn't. It absorbs the impact of any fall.

Writing Practice

19. Translate the text. Write a short paragraph summarizing it.

Special Kinds of Passenger Elevators

Some large buildings have double-deck elevators, which have two compartments and serve two floors with each stop. People who want to go to odd-numbered floors enter the lower compartment of the elevator on the first floor. Those people who want even-numbered floors enter on the second floor and ride the upper compartment.

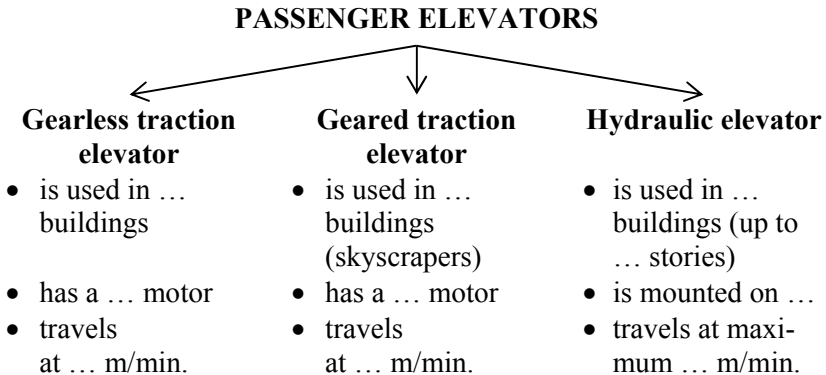
Observation elevators have glass sides and travel along the walls of the interior courts or along the outside walls of buildings. Passengers can view the surrounding area through the glass sides.

Some tall buildings have express elevators that travel non-stop to certain floors where passengers change to local elevators. The local elevators then carry the people to their floors.

Hospital elevators are large enough to carry beds.

Summarizing

20. Fill in the diagram using the information from ex. 4. Speak on the types of bulk-handling machines. Use the words: *consist of, include, are divided into*.



21. Make up a plan of the text (ex. 4).

22. Think and speak on:

- what an elevator is;
- elevator operation;
- control devices;
- elevator controllers;
- types of elevators;
- the invention of the modern safe passenger elevator.

23. Discuss with your group mates or in pairs whether passenger elevators safe.

UNIT 7 BULK-HANDLING MACHINES

Pre-reading tasks

1. Study the terms.

- | | |
|--------------------------------|--|
| a) materials-handling machines | подъёмно-транспортные машины |
| bulk-handling machines | (строительные) машины для перемещения сыпучих или штучных материалов |
| earth-moving machines | машины для земляных работ |
| road-making machines | дорожные машины |
| conveyor | конвейер, транспортёр |
| belt conveyor | ленточный конвейер |
| bucket conveyor | ковшовый конвейер |
| screw conveyor | винтовой конвейер |
| carrier | тягач |
| tractor | трактор; тягач |
| truck | грузовой автомобиль |
| (power) shovel | одноковшовый экскаватор |
| pile-driver | свайный копёр (мн. ч. копры) |
| clamshell | экскаватор с грейферным ковшом, грейфер |
| dragline | канатный скребковый экскаватор (драглайн) |
| hoe (=backhoe) | экскаватор типа «обратная лопата» |
| scraper | скрепер |
| bulldozer | бульдозер |
| grader | грейдер |
| trench-digger | траншеекопатель |
| hole-digger | ямокопатель |
| cable-laying machine | кабелеукладчик |
| loader | погрузчик |
| b) endless belt | бесконечная лента (конвейера) |
| trough | лоток |
| pulley | барабан (конвейера) |

drive pulley	приводной барабан (конвейера)
roller	ролик
bucket	ковш
scoop	ковш
superstructure	надстройка
handle	рукоять
rotating frame	поворотная платформа
power plant	силовая установка
c) front-end	фронтальный
heavy-framed	тяжелорамный
rubber-tired	пневмоколёсный
wheel-mounted	на колёсном ходу
self-loading	самозагружающийся
d) unpackaged	бестарный; без упаковки
divided	измельчённый
fine	мелкий
solid	твёрдый
uniform	однородный
free-flowing	сыпучий
bulk	сыпучий
in bulk	насыпью, россыпью

2. Use the dictionary to translate the words.

to handle	to function	the former ... the latter ...
to maneuver	to push	both ... and ...
to consist (<i>of</i>)	to loop (<i>over</i>)	highly
to enable	to surface (<i>with</i>)	
to hang (<i>from</i>)	to fit (<i>with</i>)	

3. Match the equivalents.

- | | |
|----------------------------|-------------------------------|
| 1) operating equipment | a) по установленному маршруту |
| 2) crawler belt | b) обеспечивать энергией |
| 3) general-purpose machine | c) гусеничная лента |
| 4) truck mount | d) земляные работы |
| 5) yard | e) система автомагистралей |

- | | |
|--------------------------------|---|
| 6) at the front | f) с нижней разгрузкой |
| 7) at the rear | g) рабочий орган |
| 8) earth-moving operations | h) с постоянной скоростью |
| 9) side-dumping | i) склад открытого хранения |
| 10) end-dumping | j) спереди |
| 11) over fixed paths | к) с боковой разгрузкой |
| 12) at a fixed speed | l) сзади |
| 13) crawler mount | м) установка на гусеничном ходу |
| 14) with an up-and-over action | н) машина общего назначения |
| 15) to supply power | о) с подъёмно-переворотным действием |
| 16) highway system | р) установка, смонтированная на грузовом автомобиле |

Reading task

4. Read the text carefully.

Bulk-handling machines are a group of materials-handling machines for handling unpackaged, divided materials.

Bulk materials are solid, free-flowing materials. We say that such materials are in bulk. The handling of these unpackaged, divided materials is done by bulk-handling machines. Wet or sticky materials may also be handled by some of the machines that are used for bulk materials.

Bulk-handling machines include conveyors, earth-moving machines and road-making machines.

Conveyor is a device for moving uniform loads over fixed paths at a fixed speed. There are about 130 types of conveyors. **Belt conveyor** consists of an endless belt that is looped over two pulleys. One of the pulleys is called the drive pulley and supplies the power that keeps the belt moving. The belt travels over a series of rollers that reduce friction and support the belt. Most belt conveyors are powered by an electric motor. For moving bulk material, such as sugar, salt or sand, the belt forms a trough. Belt conveyors are used to load and unload ships, trucks and wagons. Instead of belts **bucket conveyor** has chairs with buckets hanging from the chain. Such type is ideal for sand or coal. **Screw conveyor** consists of a screw in a trough. When the screw turns, the material moves farther. These conveyors are used for fine bulk materials.

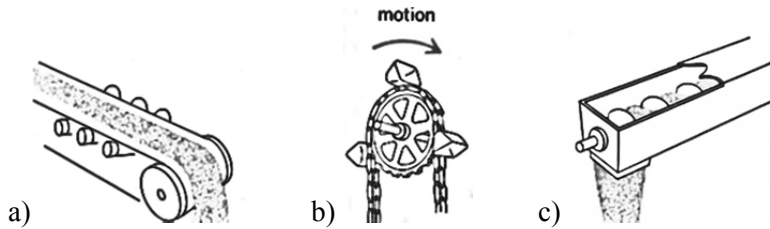
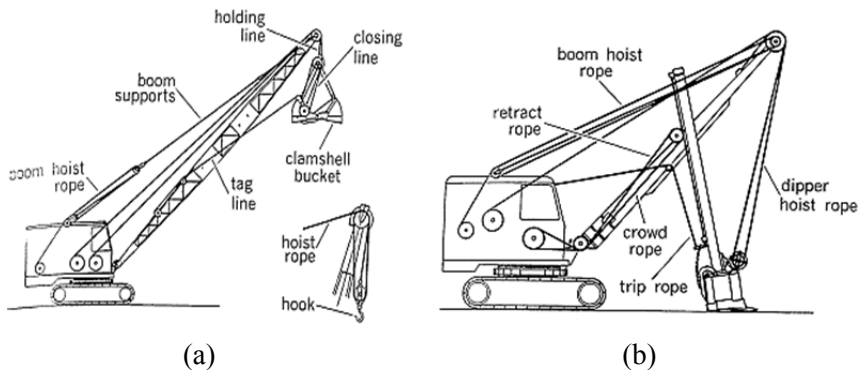


Figure 1. Conveyors. (a) Belt conveyor. (b) Bucket conveyor. (c) Srew conveyor

Earth-moving machines. Power cranes and shovels perform many operations moving bulk materials. When functioning as cranes and fitted with many below-the-hook devices, they are used on construction jobs and in industrial plants. Such attachments as magnets, buckets, and pile-drivers enable cranes to handle many products.

The revolving superstructure consists of the rotating frame and the operating equipment on it. It may be carried on a crawler mount, consisting of two continuous parallel crawler belts. A truck mount is a heavy-framed, rubber-tired carrier supported by two or more axles. It has the general characteristics of a heavy-duty truck. The carrier may be controlled for a road travel from a cab mounted on the carrier or located on the revolving superstructure.

Six types of front-end operating equipment are standard: crane, clamshell, dragline, pile-driver, shovel, and hoe. This common below-the-hook equipment is used with *crane*, *clamshell*, *dragline*, and *pile-driver*. The boom usually consists of two sections, between which additional sections may be inserted.



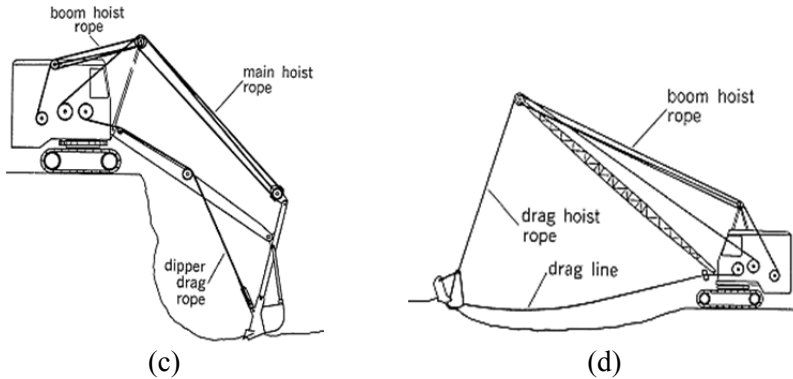


Figure. 2. A power crane fitted with a (a) Clamshell; (b) Dragline; (c) Shovel; (d) Backhoe

Backhoes and **shovels** are used for handling bulk materials in plants and yards. Lighter models are usually wheel-mounted, while heavy-duty ones are carried on tractors. There are two basic types: those that load and dump only at the front or at the rear, and those with an up-and-over action which permits loading at the front end and discharging at the rear. This often saves time, because it is not necessary to maneuver when loading wagons.

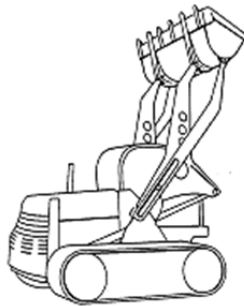


Figure 3. A tractor fitted with a shovel for up-and-over operation

Specialized equipment for mechanized pit mining has been developed. Power cranes, shovels, and backhoes are actively used in quarries, and other earth-moving operations.

Road-making machines. The rapid development of highway systems has led to the wide use of road-making machines. Some of them are

modifications of equipment that is standard to this kind of work; others are highly specialized. The former group are machines that have been developed by adding attachments to wheel and crawler tractors. Machines such as *bulldozers* and *graders* do not function as true handling equipment because they do not pick up and transport materials but push them. On the other hand, self-loading *scrapers* do transport materials and are usually constructed so that they are either side- or end-dumping. Other general-purpose machines used in highway construction are *trench-diggers*, *hole-diggers*, and *cable-laying machines*. Highly specialized equipment is used for surfacing the road with concrete or other material.

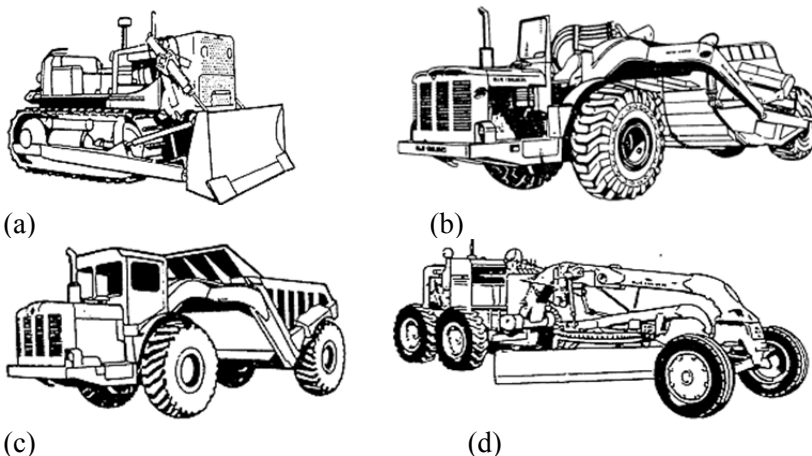


Figure 4. Road-making machines. (a) Bulldozer. (b) Motor scraper. (c) Heavy-framed truck. (d) Motor grader

Comprehension check

5. Continue the phrases.

1. Bulk-handling machines are a group of...
2. Bulk-handling machines include...
3. Common below-the-hook equipment is used with...
4. Conveyor is a device for...
5. For moving bulk material, such as sugar, salt or sand, the belt form a...

6. Highly specialized equipment is used for...
7. Other general-purpose machines used in highway construction are...
8. Backhoes and shovels are used for...
9. Screw conveyor consists of...
10. The rapid development of highway systems has led to...
11. The revolving superstructure consists of...

6. Insert the missing words.

1. A truck mount is a ... supported by two or more axles.
2. Belt conveyor consists of ... that is looped over two pulleys.
3. Belt conveyors are used ... ships, trucks and railroad cars.
4. Bulk materials are ... materials.
5. Instead of belts bucket conveyor has ... hanging from the chain.
6. ... do not function as true handling equipment because they do not pick up and transport materials but push them.
7. Most bucket conveyors are powered by an ... motor.
8. The belt travels over ... that reduce friction and support the belt.
9. The boom usually consists of ... , between which additional sections may be inserted.
10. There are about ... types of conveyors.
11. When ... turns, the material moves farther.

7. State whether the statements are true or false. Correct if necessary.

1. Belt conveyors are used for fine bulk materials.
2. Bulldozers and graders function as true handling equipment.
3. Earth-moving machines are used on construction jobs and in and around industrial plants.
4. Highly specialized road-making equipment is used for surfacing.
5. Road-making machines are designed for mechanized pit mining.
6. Screw conveyor is ideal for sand or coal.
7. The drive pulley supplies the power that keeps the belt moving.
8. The superstructure consists of a rotating frame and an operating equipment on it.
9. There are three basic types of backhoes and shovels.
10. Trench-diggers, hole-diggers, and cable-laying machines are general-purpose machines used in highway construction are.

8. Answer the questions.

1. What are bulk-handling machines used for?
2. What groups do bulk-handling machines consist of?
3. What types of earth-moving machines do you know? Road-making machines? Conveyors?
4. What supplies the power that keeps the conveyor belt moving?
5. Do you know the structural parts of an earth-moving machine? What are they?
6. Where can earth-moving machines be used?
7. How does equipment with an up-and-over action save time?
8. Road-making machines are used for building roads and highways, aren't they?
9. Bulldozers and graders aren't true handling equipment, are they?
10. Self-loading scrapers are either side- or end-dumping, aren't they?

Vocabulary practice

9. Complete the text using the words from the list below.

(a) *dragline* (b) *scoop* (c) *excavating* (d) *specialized*
(e) *square* (f) *loader* (g) *hook* (h) *bulk-handling*

A bucket is a (1) ... container attached to a machine. It is a component of a (2) ... machine. The name "bucket" originates from buckets used in water wheels. The bucket can be attached to the lifting (3) ... of a handle at the end of the boom of an (4) ... machine; to the cables of a (5) ... ; to the boom of a shovel; to (6) ... ; or to a dredge. The bucket has an inner volume. Buckets have various sizes and shapes. The cross-section can be round or (7) A shallower bucket is called a (8)

Note:

to originate	происходить
dredge	драга
inner volume	внутренний объём
cross-section	поперечное сечение

10. Complete the text translating the words in brackets.

The conveyor is one of the basic types of (1) ... (**подъёмно-транспортные машины**) used in (2) ... (**промышленность**) and business.

Conveyors are used in nearly every phase of **(3) ... (производство)** and distribution. Many industries depend on conveyors. The conveyor has become a symbol of mass production. One of the first fully automated factories was Oliver Evans' flour mill, built in Wilmington, (Delaware, USA) in 1785. Evans used **(4) ... (ленточные конвейеры)**, **(5) ... (ковшовые конвейеры)** and **(6) ... (винтовые конвейеры)** to move grain and flour continuously. Henry Ford was the first to use conveyors for moving assembly line in 1912. In airports, **(7) ... (конвейерные ленты)** carry luggage. Some **(8) ... (здания)** now use moving walkways, which **(9) ... (состоят из)** a ramplike conveyor belt with handrails. An escalator is a conveyor belt that forms stairs as it moves around as an **(10) ... (бесконечная лента)**. Another example of conveyors is belt conveyors used on supermarket checkout stands.

Note:

distribution	распределение
factory	фабрика
flour mill	мукомольная мельница
grain	зерно
flour	мука
moving assembly line	движущая сборочная линия
luggage	багаж
moving walkway	движущаяся дорожка
handrails	поручни
stairs	ступени
checkout stands	кассы

11. Match the words with their definitions.

- | | | | |
|--------------------|--------------------------|---------------------------------|------------------------|
| <i>(a) backhoe</i> | <i>(b) trench-digger</i> | <i>(c) clamshell</i> | <i>(d) hole-digger</i> |
| <i>(e) shovel</i> | <i>(f) pile-driver</i> | <i>(g) grader</i> | <i>(h) dragline</i> |
| <i>(i) scraper</i> | <i>(j) conveyor</i> | <i>(k) cable-laying machine</i> | |

1. A machine for laying cables.
2. A machine used for digging holes.
3. A machine used for digging trenches.
4. A machine used for driving down piles with a special hammer.
5. A machine used for grading the surface.
6. A machine used for scraping the surface.
7. An excavating machine with a backhoe as an operating equipment.

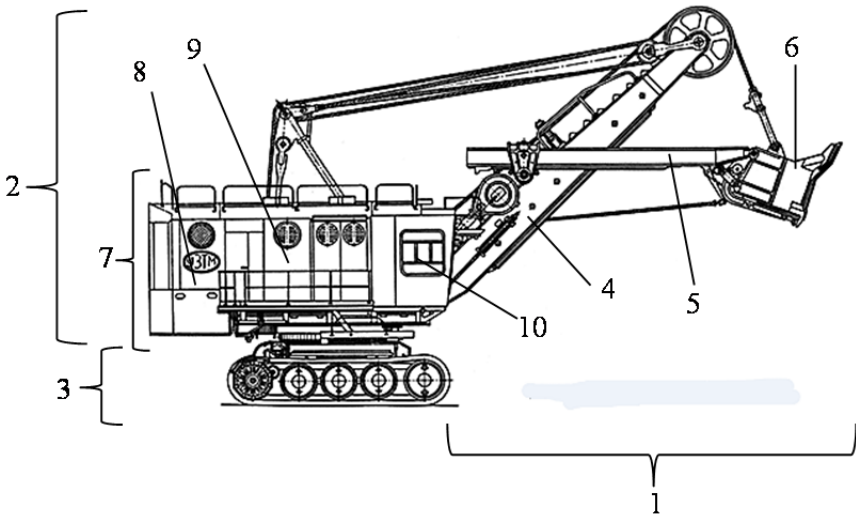
8. An excavating machine with a bucket that is attached by cables, one of which is called a drag line.
9. An excavating machine with a clamshell as an operating equipment.
10. An excavating machine with a shovel as an operating equipment.
11. Equipment that conveys material continuously in a fixed path.

12. Translate the text in a written form.

Power shovel consists of a rotating frame with a power plant, driving and controlling mechanisms, sometimes a counterweight, and a front-end operating equipment, such as a boom that supports a handle with a digger (a tool for excavating and moving dirt and rocks) at the end. The whole mechanism is mounted on a base platform with crawler tracks or wheels.

13. Find the structural parts of a power shovel in the picture below. Information in ex. 4 and ex. 12 may help you.

- | | | | |
|---------------------------|--------------------------------|-------------------|---------------------------|
| <i>(a) base platform</i> | <i>(b) boom</i> | <i>(c) handle</i> | <i>(d) counterweight</i> |
| <i>(e) rotating frame</i> | <i>(f) digger</i> | <i>(g) cab</i> | <i>(h) superstructure</i> |
| <i>(i) power plant</i> | <i>(j) operating equipment</i> | | |



Language focus

14. Match the synonyms.

1) carrier; 2) hoe; 3) scoop/digger; 4) bulk; 5) highway; 6) rotate;
7) rapid; 8) function; 9) general-purpose; 10) solid

a) quick; b) revolve; c) road; d) backhoe; e) free-flowing; f) standard;
g) tractor; h) bucket; i) work; j) hard

15. Match the antonyms.

1) the former; 2) at the rear; 3) heavy-framed; 4) end-dumping;
5) rapid; 6) standard; 7) pull; 8) load

a) specialized; b) slow; c) side-dumping; d) at the front; e) push;
f) the latter; g) light-framed; h) unload

16. Translate the following phrases paying attention to the underlined words that can be verbs, nouns, adjectives or adverbs without changing their form and adding suffixes.

1. to handle loads; to handle a truck; the dragline handles well; a door handle; the handle of a hoe;
2. the function of a hole-digger is to make holes; mathematical function; to function well; to function as a road-making machine;
3. the first Belarusian front; a cold front; the front of the building; at the front; a front door; a front loader; the front man of the rock group
4. parallel lines; parallel crawlers; parallels never meet; they paralleled the trench to the highway; the roads run parallel;
5. 1 yard is equal to 91.44 centimeters; a house with a yard; a ship yard; a chemical plant yard.

Reading Practice

17. Read the text and choose the true statements.

Big Brutus

Big Brutus is the nickname of the Bucyrus-Erie model 1850B electric shovel. Big Brutus was the second largest machine of its type in opera-

tion in the 1960s and 1970s. It was designed to dig from 6.1 to 21.0 metres and was used in coal pit mining at West Mineral, Kansas (USA). Today it is centerpiece in a mining museum of this town.

Big Brutus is 49 metres high and weighs 4,989,516 kg. The bucket holds 69 cubic metres or 136 metric tonnes. Maximum speed is 6 metres per minute. It cost \$6.5 million in 1962 when it was transported in 150 railroad wagons to be assembled in Kansas. In 1974 it became too expensive to mine coal at the site. The machine was said to be too big to move and was left in place.

Though Big Brutus is not the largest electric shovel ever built, it is the largest electric shovel that still exists.

Note:

centrepiece

центральный экспонат (музея)



Picture 1. Big Brutus. Note the size of people near this 49-metre machine (2006)

Big Brutus...

- a) is an electric hoe;
- b) still functions at coal mines;
- c) is a centerpiece of a mining museum;
- d) moved at maximum speed of 6 metres per hour;
- e) cost \$6.5 million in 1962;
- f) is the largest electric shovel ever built.

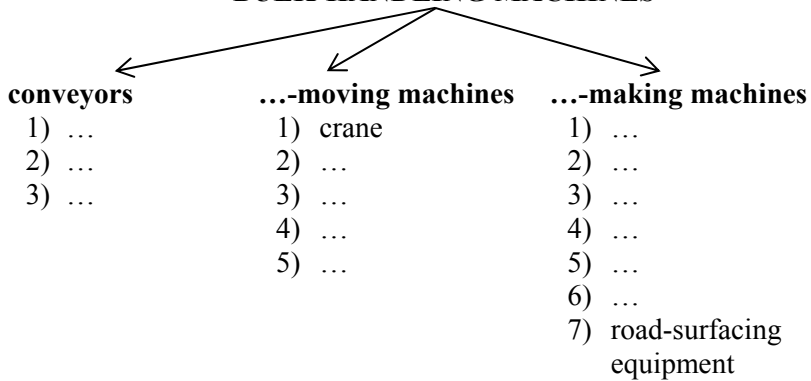
Writing Practice

18. Write a short paragraph summarizing the text (ex. 17).

Summarizing

19. Fill in the diagram using the information from ex. 4. Speak on the types of bulk-handling machines. Use the words: *consist of, include, are divided into.*

BULK-HANDLING MACHINES



20. Think and speak on:

- a) what bulking machines are;
- b) conveyors;
- c) earth-moving machines;
- d) where earth-moving machines are used;
- e) what an earth-moving machine consist of;
- f) road-moving machines.

21. Discuss with your group mates or in pairs advantages and disadvantages of various types of bulk-handling machines.

UNIT 8

CONSTRUCTION EQUIPMENT: HOISTING EQUIPMENT

Pre-reading tasks

1. Study the terms.

- | | |
|------------------------|---|
| a) hoisting equipment | подъёмное оборудование |
| construction equipment | строительное оборудование |
| construction | строительство |
| steel construction | 1) стальная конструкция; 2) возведение стальных конструкций |
| demolition | снос |
| structural framework | каркас конструкции |
| structural member | элемент конструкции |
| b) cableway | канатная дорога |
| guy derrick | вантовый деррик-кран |
| stiff-leg derrick | жестконогий деррик-кран |
| climbing crane | самоподъёмный кран |
| tower crane | башенный кран |
| c) guy wire | ванта |
| chassis | шасси |
| d) under power | самостоятельно |
| towed | на прицепе |

2. Learn to recognize international words. Give the Russian equivalents to the following words without a dictionary. Then compare your variants with the dictionary.

accuracy	control	horizontal	mobility
cable	crane dam	integral	operator
cement	designer	limit	popular
classify	diagonal	modification	section
configuration	effectiveness	material	specific

3. Use the dictionary to translate the words.

to drill
to excavate
to grade
to haul
to pave

to perform
to increase
to improve
to stretch

to depend (*on*)
to protect (*through*)
available (*for*)
to be limited (*to*)
in contrast (*to*)

4. Match the equivalents.

- | | |
|--|--|
| 1) selection for a specific job | a) глушение шума |
| 2) are classified according to | b) дноуглубительные работы |
| 3) to develop modifications | c) контроль выбросов |
| 4) dredging operations | d) разрабатывать модификации |
| 5) emission control | e) неотъемлемая часть машины |
| 6) to increase accuracy | f) эффективно выполнить работу |
| 7) sound attenuation | g) повышать точность |
| 8) to rotate 360 degrees | h) классифицируются в соответствии с |
| 9) high-rise building construction | i) поворачиваться на 360 градусов |
| 10) to complete the job effectively | j) строительство высотных зданий |
| 11) an integral part of a machine | k) выбор для специфической работы |
| 12) to improve operator's comfort and safety | l) улучшать комфорт и безопасность машиниста |

5. What verbs are used to make up the nouns below? Translate.

Construction, demolition, excavation, hoisting, hauling, grading, paving, drilling, pile-driving.

Reading task

6. Read the text carefully:

Construction equipment is various relatively heavy machines which perform construction (or demolition) under power. The power plant is usually an integral part of a machine, but in some cases it is towed. As a rule construction machines are classified according to their functions such as hoisting, excavating, hauling, grading, paving, drilling, or pile driving. There have been few changes for many years in the basic types and configurations of machines available for specific jobs. Designers of new machines develop modifications that increase speed, efficiency, and accuracy; that improve operator's comfort and safety; and that protect people through sound attenuation and emission control. The selection of a machine for a specific job depends on the ability of the machine to complete the job effectively, and on its availability.

Hoisting equipment. This class of equipment is used to raise or lower materials from one elevation to another or to move from one point to another over an obstruction. The main types of hoisting equipment are derricks, cranes, elevators, cableways, and conveyors.

The two main types of *derricks* are the guy derrick and the stiff-leg derrick. The former has a mast that is held in a vertical position by guy wires and a boom that can rotate with the mast 360 degrees. In the stiff-leg type the mast is tied in two or more rigid structural members, and the rotation of the boom is limited by the position of these members. The derrick is practical only where little mobility is required as in some types of steel construction, excavation of a shaft, or hoisting of materials through a shaft.

A *crane* is basically a fast-moving boom mounted on a frame containing the power supply and mechanisms for moving the boom and for raising and lowering the load cables that run through sheaves at the top of the boom. Mobile cranes are attached to a chassis mounted on wheels or crawler tracks. This type of machine is used in all operations where mobility is necessary. Tower cranes and climbing cranes have become popular all over the world for high-rise building construction where mobility is unimportant. These machines, which carry horizontal or diagonal masts or booms, can "grow" with the construction by climbing with it or by adding sections to their own towers. In contrast to mobile crane they are not restricted in boom reach.

The **construction elevator**, like the passenger elevator, consists of a car or platform that operates within a structural framework and is raised and lowered by cables. The elevator is restricted to moving relatively light materials on jobs of small areas.

A **cableway** includes a trolley that runs on main load cables stretched between two or more towers. The use of the cableway in construction is limited to dams, to some dredging operations, and in special cases to bridges.

Occasionally a **conveyor** is used to raise materials needed for construction of low buildings. This machine, which has a movable endless belt mounted on a frame, can carry only light loads such as bricks and cement sacks and it is not practical for building more than one or two floors.

Comprehension check

7. Continue the phrases.

1. A crane is...
2. As a rule construction machines are classified according to...
3. Construction equipment is various relatively heavy machines which...
4. Designers of new machines develop modifications that...
5. Mobile cranes are attached to...
6. Occasionally a conveyor is used to...
7. The derrick is practical only where...
8. The main types of hoisting equipment are...
9. The selection of a machine for a specific job depends on...
10. The two main types of derricks are...

8. Insert the missing words.

1. ... have become popular all over the world for high-rise building construction where mobility is unimportant.
2. A ... includes a trolley that runs on main load cables stretched between two or more towers.
3. In ... the mast is tied in two or more rigid structural members, and the rotation of the boom is limited by the position of these members.

4. The construction elevator, like the passenger elevator, consists of ... that operates within a structural framework and is raised and lowered by cables.
5. The elevator is restricted to moving ... on jobs of small areas.
6. The power plant is usually ... of a machine, but in some cases it is towed.
7. The use of ... in construction is limited to dams, to some dredging operations, and in special cases to bridges.
8. There have been ... for many years in the basic types and configurations of machines available for specific jobs.
9. These machines, which carry ... , can “grow” with the construction by climbing with it or by adding sections to their own towers.
10. This machine, which has ... mounted on a frame, can carry only light loads such as bricks and cement sacks.

9. State whether the statements are true or false. Correct if necessary.

1. A cableway has a movable endless belt mounted on a frame.
2. A cableway includes a trolley that runs on main load cables stretched between three or more towers.
3. Construction machines are classified according to their functions such as drilling, excavating, hauling, hoisting, grading, paving, and pile driving.
4. Derricks are practical only where little mobility is required.
5. Elevators are used in bridge construction.
6. Mobile cranes are attached to wheels or crawler tracks mounted on a chassis.
7. The elevator is limited to moving relatively light materials.
8. The power plant is usually towed.
9. There have been many changes for many years in the basic types and configurations of machines available for specific jobs.
10. Tower cranes and climbing cranes can “grow” with the construction.

10. Answer the questions.

1. What is construction equipment?
2. What groups does construction equipment consist of?
3. What main types of hoisting equipment are there?

4. Derricks are very useful on jobs where much mobility is necessary, aren't they?
5. What is the main difference between a guy derrick and a stiff-leg derrick?
6. Where is a construction elevator used?
7. Where are mobile cranes the most practical?
8. What cranes are used for high-rise building construction?
9. What machine can be sometimes used to raise and lower materials necessary for low building construction?
10. What is used for constructing dams, dredging operations, and bridges?

Vocabulary practice

11. Match the equipment with its name.

- 1) cableway
- 2) climbing crane
- 3) tower crane
- 4) conveyor
- 5) guy derrick
- 6) mobile crane
- 7) stiff-leg derrick
 load="1" data-bbox="418 405 612 548">
- 8) construction elevator



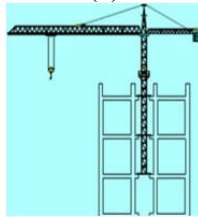
(a)



(b)



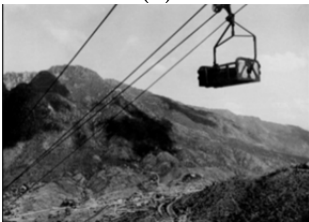
(c)



(d)



(e)



(f)



(g)



(h)

12. Complete the text using the words from the list below.

- (a) boom (b) guy wires (c) loads (d) floating
(e) mast (f) stiff legs (g) counterweight

A stiff-leg derrick is a derrick with a (1) ... similar to a guy derrick, but instead of (2) ... to secure the top of the (3) ... , it uses two or more stiff members, called (4) ... , which can resist tensile and compressive forces. Sills may also be used to connect the bottom ends of the stiff legs and the base of the mast. There may be a (5) ... on the sills behind the stiff legs to lift heavy (6) A stiff-leg derrick on a ship or a barge is called a (7) ... stiff-leg derrick.

Note:

to secure	закрепить
tensile and compressive forces	силы растяжения и сжатия
sill	подкос

13. Complete the text translating the words in brackets.

A (1) ... (**канатная дорога**) – sometimes called a cable crane – often (2) ... (**поднимает**) and (2) ... (**перевозит**) such materials as earth and rock. The (3) ... (**груз**) is carried in buckets attached to a (4) ... (**трос**) that moves between two (5) ... (**башнями**). This (6) ... (**оборудование**) transports materials over (7) ... (**длинные**) distances. It (8) ... (**используется**) for bringing coal to and from (9) ... (**электростанции**), for loading ships, or for dam (10) ... (**строительство**).

Note:

a cable crane	кабель-кран
---------------	-------------

Language focus

14. Match the synonyms.

1) restricted; 2) as a rule; 3) rigid; 4) include; 5) selection

a) contain; b) choice; c) stiff; d) limited; e) usually

15. Match the antonyms.

1) high-rise; 2) important; 3) raise; 4) construction; 5) many
a) demolition; b) lower; c) low; d) few; e) unimportant

16. Fill in the right prepositions.

(a) *between* (b) *over* (c) *under* (d) *through*
(e) *within* (f) *from* (g) *for* (h) *in* (5)
(i) *of* (4) (j) *to* (4) (k) *on* (2)

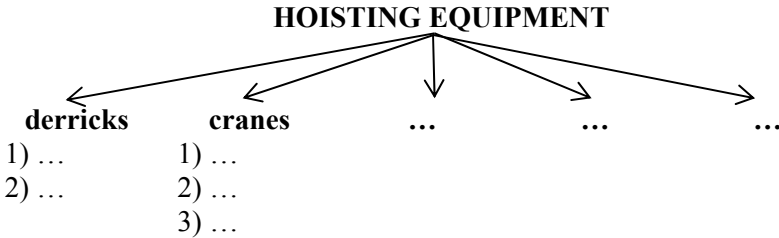
1. Construction equipment performs construction or demolition ... power.
2. Construction machines are classified according ... their functions.
3. There are few changes ... the basic types and configurations ... machines available ... specific jobs.
4. Hoisting equipment is also used to move materials ... one point ... another ... an obstruction.
5. The mast of the stiff-leg derrick is tied ... two or more rigid structural members.
6. The derrick is practical ... hoisting materials ... a shaft.
7. A cableway trolley runs ... main load cables stretched ... two or more towers.
8. Construction elevator consists ... a car or platform that operates ... a structural framework.
9. The elevator is restricted ... moving relatively light materials ... jobs ... small areas.
10. ... contrast ... mobile cranes, tower and climbing cranes are not restricted ... boom reach.

Writing Practice

17. Write a short paragraph summarizing the text (ex. 6).

Summarizing

18. Fill in the diagram using the information from ex. 6. Speak on the types of bulk-handling machines. Use the words: *consist of, include, are divided into*.



19. Think and speak on:

- a) what construction equipment is;
- b) what hoisting equipment is;
- c) derricks;
- d) cableways;
- e) construction elevators;
- f) types of cranes;
- g) conveyors.

20. Discuss with your group mates or in pairs advantages and disadvantages of various types of hoisting equipment.

21. Choose a hoisting machine and make a presentation.

UNIT 9
CONSTRUCTION EQUIPMENT: EXCAVATING EQUIPMENT
(Standard Land Excavators)

Pre-reading tasks

1. Study the terms.

a) excavating machine	землеройная машина
excavating equipment	землеройное оборудование
combination excavator and hauler	выемочно-погрузочная машина
hauling unit	транспортировочное средство
land excavator	сухопутный экскаватор
continuous bucket excavator	многоковшовый экскаватор
dredge	драга
trencher	траншеекопатель
grab	захватное устройство
grapple	захват
b) leaf (pl. leaves)	челюсть (захватного устройства)
open-topped bucket	ковш открытого типа
hinged bottom bucket	ковш с откидным днищем
c) standard	обычный
articulated	сочленённый

2. Use the dictionary to translate the words.

to dig (dug, dug)	to dump	bank
to drop	to run	

3. Match the equivalents.

- | | |
|-----------------------------|---------------------------|
| 1) are closed hydraulically | a) ковш с двумя челюстями |
| 2) upside-down | b) рыхлая порода |
| 3) in all but | c) во всём, кроме |

- | | |
|---|--|
| 4) to switch from ... to ... | d) навешиваемый на |
| 5) loose rock | e) мягкая почва |
| 6) soft soil | f) перевёрнутый вверх дном |
| 7) dense soil | g) хорошо приспособлен к |
| 8) well-adapted to | h) плотная почва |
| 9) mounted on | i) стоить на половину дешевле |
| 10) intermittent activities | j) переключаться с ... на ... |
| 11) two-sided bucket | k) прерывистая деятельность |
| 12) to cost one-half times cheaper than | l) закрываются с помощью гидравлического привода |

Reading task

4. Read the text carefully.

Excavating equipment is divided into two main classes: land excavators and dredges. Each has many variations.

Land excavators include machines:

- 1) that simply dig earth and rock and place it in separate hauling units;
- 2) that pick up and transport the materials.

The first group is called standard land excavators and includes power shovels, backhoes, cranes with a variety of buckets, front-end loaders, trenchers, and continuous bucket excavators. The second group is called combination excavators and haulers and consists of such machines as bulldozers, scrapers of different types, and sometimes front-end loaders.

Standard land excavators. A *power shovel* is regarded the most efficient machine for digging into vertical banks and for handling heavy rock. Generally mounted on crawler treads, the power shovel carries a short boom. On the boom is a movable handle carrying an open-topped bucket. The bucket digs in an upward direction away from the machine and dumps its load by lowering the front of its hinged bottom.

A *front-end loader* may well replace power shovel in all but the biggest operations. Loaders are built with buckets of different capacities. The loader is an articulated bucket mounted on movable arms at the front of a crawler or rubber-tired tractor. It has the advantage of mobility, speed, economy of cost and operation, and light weight. A loader of any capacity can cost one-half or even one-third times cheaper than a power

shovel of the same capacity. Besides, it requires only one person to run it, while for a power shovel two or more operators are required.

In simple words, a *backhoe* is an upside-down power shovel. Its bucket, mounted on a hinged boom, digs upward toward the machine and unloads by being inverted over the dumping point. Backhoes are manufactured as individual machines, but more often they are attachment mounted on a crawler crane, a rubber-tired truck crane, or a tractor (which is usually has a front-end loader bucket at the other end). It is particularly well adapted to digging deep trenches.

Draglines have remained relatively unchanged in design and control systems for almost 100 years. A dragline is a four-sided bucket that is used mainly on soil that is too wet to support an excavating machine. It is usually carried on a mobile machine mounting a crane boom, but it can also be worked from a cableway where excavating distances are great. The bucket is carried or cast to a point ahead of its support and dropped to the ground. The dragline excavates and fills itself while it is drawn across the ground. It empties when its front end is lowered.

A *clamshell* is a two-sided bucket that can dig only in vertical direction. The bucket is dropped while its leaves are open and digs as they close. Earlier, clamshells were suspended from cables on cranes and worked only under their own weight. Therefore they were not accurate in digging and were practical only in relatively soft soil or loose rock. Today many clamshell buckets are attached directly to power booms, are closed hydraulically, and can work with greater accuracy in dense soils.

Grapples are special-purpose grabs that work on the principle of the clamshell. The grapple is used mainly for handling rock, pipes, and logs.

A *trencher* is equipment for digging trenches. It varies in size from small hand-pushed units used for getting small pipes from streets to private homes to monsters of many tons which can cut 1.2-m trench for 3,200 km of transcontinental pipelines. All, however, work basically on the same principle: a series of buckets, mounted on a chain or a wheel, lift dirt from the ground and deposit it alongside the dug trench.

Continuous bucket excavator works like trenching machine but is designed to remove earth and loose rock from a wider area and at a shallower depth. These machines are self-propelled. They load trucks continuously and can switch from a filled to an empty truck very quickly because they perform no intermittent activities, such as those necessary

in shovel or loader operations. All this makes the continuous bucket excavator a fast, economical machine for large excavating jobs.

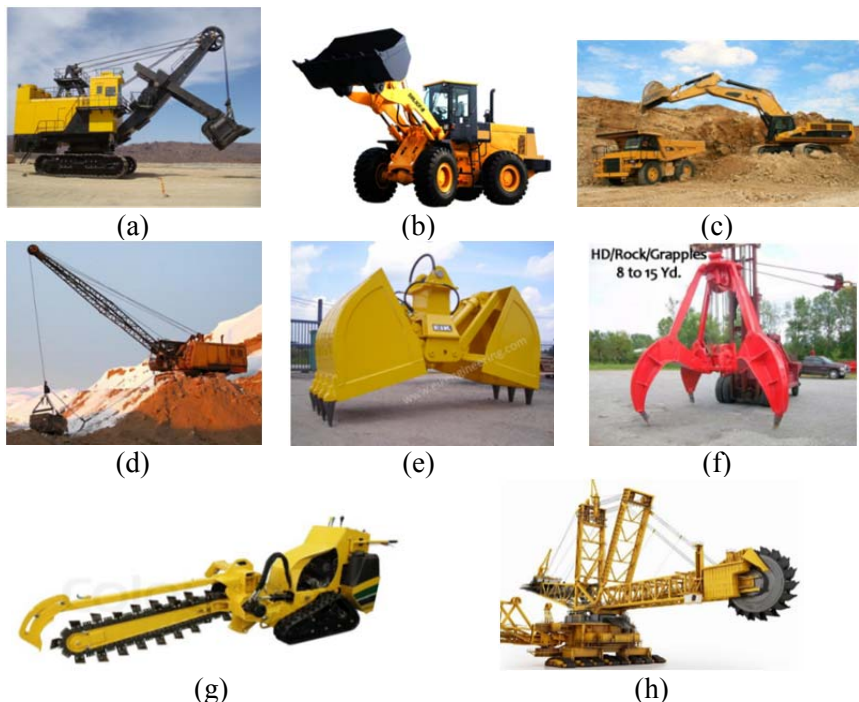


Figure 1. Standard land excavating equipment.

(a) Power shovel. (b) Front-end loader. (c) Backhoe. (d) Dragline. (e) Clamshell.
 (f) Grapples. (g) Trencher. (h) Continuous bucket excavator

Comprehension check

5. Continue the phrases.

1. A backhoe is particularly well adapted to digging...
2. A power shovel is regarded the most efficient machine for...
3. A trencher is equipment for...
4. Combination excavators and haulers consist of...
5. Continuous bucket excavator works like trenching machine but...
6. Excavating equipment is divided into...

7. In simple words, a backhoe is...
8. Standard land excavators include...
9. The bucket digs in an upward direction away from the machine and dumps its load by...
10. The dragline excavates and fills itself while...

6. Insert the missing words.

1. A ... is a four-sided bucket that is used mainly on soil that is too wet to support an excavating machine.
2. A ... is a two-sided bucket that can dig only in vertical direction.
3. All this makes ... a fast, economical machine for large excavating jobs.
4. All, however, work basically on the same principle: a series of buckets, ... , lift dirt from the ground and deposit it alongside the dug trench.
5. Earlier, clamshells were suspended from ... and worked only under their own weight.
6. Generally ... crawler treads, the power shovel carries a short boom.
7. Grapples are ... that work on the principle of the clamshell.
8. Land excavators include machines ... , and those that
9. On the boom is ... carrying an open-topped bucket.
10. The bucket is carried or cast to ... and dropped to the ground.
11. Today many clamshell buckets are ... directly to power booms, are closed hydraulically, and can work with greater accuracy in dense soils.

7. State whether the statements are true or false. Correct if necessary.

1. A backhoe is an upside-down dragline.
2. A trencher is equipment for digging holes.
3. A trencher varies in size from small hand-pushed units to monsters of many tons.
4. Continuous bucket excavators are self-propelled.
5. Continuous bucket excavators have remained relatively unchanged in design and control systems for almost 100 years.
6. Continuous bucket excavators lift dirt from the ground and deposit it alongside the dug trench.

7. Draglines are used mainly on soil that is too wet to support excavating machines.
8. Grapples are used mainly for handling logs, pipes, and rock.
9. The backhoe is an articulated bucket mounted on movable arms at the front of a crawler or rubber-tired tractor.
10. There is a movable handle carrying an open-topped bucket on the boom of a clamshell.
11. Today many clamshell buckets work with greater accuracy in dense soils than earlier.

8. Answer the questions.

1. What classes of excavating equipment do you know?
2. What machines do standard land excavators include? Combination excavators and haulers?
3. What equipment is used together with a dragline if excavating distances are great?
4. Which is usually more economical: a power shovel or a front-end loader? Why?
5. What excavating machine is the best for digging deep trenches?
6. How many leaves does a clamshell have?
7. What machine is the best for large excavating jobs?
8. What machine has an articulated bucket mounted on movable arms at the front of a crawler or rubber-tired tractor?
9. Do all trenchers work basically on the same principle?
10. Continuous bucket excavators work like trenching machines, don't they?
11. Why can continuous bucket excavators switch from a filled to an empty truck very quickly?

Vocabulary practice

9. Complete the text using the words from the list below.

- | | | | |
|-------------------|-------------------------------|--------------------|---------------------|
| <i>(a) bucket</i> | <i>(b) construction</i> | <i>(c) machine</i> | <i>(d) dragline</i> |
| <i>(e) sold</i> | <i>(f) electricity</i> | <i>(g) largest</i> | <i>(h) weight</i> |
| <i>(i) cost</i> | <i>(j) excavating machine</i> | | |

Big Muskie was a coal mining (1) ... owned by the Central Ohio Coal Company. It operated in the U.S. state of Ohio from 1969 to 1991. The machine was nearly 22 stories tall, and its (2) ... was nearly 13,000 tons. The (3) ... of Big Muskie was 170 m³, so it was the (4) ... single-bucket (5) ... ever created. The (6) ... took about two years and over 200,000 man hours. It (7) ... \$25 million in 1969. The dragline had a crew of 5 people and was powered by (8) ... supplied at 13,800 volt. It worked around the clock. In late 1999 the (9) ... was broken down and (10) ... for \$700,000 in scrap.

Note:

man hours	человеко-часы
around the clock	круглосуточно
was broken down	разобран на части
in scrap	в виде лома

10. Translate the words from the list below and use them to complete the text.

- | | | | |
|--------------------|---------------------------|-------------|------------|
| (a) гидравлический | (b) грейфер | (c) челюсти | (d) тросы |
| (e) оборудованы | (f) поднятие | (g) захват | (h) рыхлый |
| (i) землеройный | (j) подъёмно-транспортный | | |

A grab bucket is an (1) ... and (2) ... tool with hinged sides or leaves. It is used for digging deep holes or for (3) ... material to high places. A grab bucket may have two, three, or four movable (4) A two-sided bucket is somewhat rectangular in shape and is called a (5) A three- or four-leaved bucket is ball-shaped and is called a (6) For hard digging, clamshells (7) ... with strong teeth. For handling (8) ... material such as sand no teeth are used. Most grab buckets are still suspended from (9) ... and activated by them, although cable-suspended buckets with (10) ... openers and closers have become more popular.

Note:

grab bucket	грейферный ковш
teeth	зубья
opener	открыватель
closer	закрыватель

11. Match the words with their definitions.

(a) backhoe (b) bucket (c) clamshell (d) grapple (e) shovel

1. A bucket having two hinged leaves.
2. A bucket similar to a clamshell but usually having more leaves.
3. A bucket that is attached to a hinged boom and is drawn backward to move earth.
4. A bucket that is attached to a hinged boom and is drawn forward to move earth.
5. A scoop of any excavating machine.

Language focus

12. Match the synonyms.

1) two-sided; 2) earth-moving; 3) trencher; 4) soil; 5) run

- a) trench-digger/trenching machine; b) two-leafed; c) dirt; d) operate;
e) excavating

13. Match the antonyms.

1) loose; 2) filled; 3) continuous; 4) shallow; 5) open; 6) away from;
7) special-purpose

- a) intermittent; b) empty; c) deep; d) close; e) towards; f) dense;
g) general-purpose

14. Translate the following phrases paying attention to the underlined words.

1. empty bucket; to empty the truck; this excavator empties quickly
2. to run 3 miles; the road runs through the forest; to run a dragline; the new loader runs perfectly
3. a leaf of a tree, a leaf of a book ;a leaf of a clamshell; a three-leafed grapple
4. the Bank of England; a bank note; the bank of the river.

Reading Practice

15. Read the text and choose the true statements.

Bucket-Wheel Excavator (BWE)

Bucket-wheel excavators are a kind of continuous bucket excavators. They have been used in pit mining for the past century. They are used with other mining machinery to move and mine overburden. While the design of a BWE has not changed much, its size has grown drastically since the end of World War Two.

BWEs built since the 1990s have reached sizes as large as 96 meters tall, 225 meters long, and as heavy as 14,200 tons. The bucket wheel itself can be over 70 feet in diameter with as many as 20 buckets, each of which can hold over 15 cubic meters of material. BWEs can work in extreme weather conditions. Many of them operate in climates with temperatures as low as -45°C .

Current use of bucket-wheel excavators is mainly focused in the area of brown coalmining for the production of electricity, mostly in Germany and East/Southeastern Europe. There is also one BWE that extracts diamonds from the Siberian permafrost.

Note:

bucket-wheel excavator	многоковшовый роторный экскаватор
overburden	покрывающая порода
bucket wheel	ковшовое колесо
as many as 20 buckets	целых 20 ковшей
extract	добывать
permafrost	вечная мерзлота



A bucket-wheel excavator is used...

- a) in pit mining of brown coal and diamonds;
- b) in diamond making;
- c) for electric power production;
- d) in the Siberia;
- e) in Southeastern Asia.

Writing Practice

16. Translate the text in a written form.

Micro Trencher

A micro trencher is specially designed for work in urban area. It is equipped with a cutting wheel that cuts a micro trench of a smaller size than can be achieved with conventional trench digging equipment.

The width of a micro trench varies from about 30 to 130 mm with a depth of 500 mm or less. These machines are sometimes radio-controlled.

With a micro trencher, the structure of the road is maintained. Micro trenchers are used to minimize traffic or pedestrian disturbance during network laying. A micro trencher can work on sidewalks or in narrow streets, and can cut hard ground. They are also used to cut pavement for road maintenance and to gain access to utilities under roads.



Note:

traffic or pedestrian disturbance

нарушение транспортного
или пешеходного движения

pavement

дорожное полотно

17. Write a short paragraph summarizing the text (ex. 17).

Summarizing

18. Think and speak on:

- a) classifications of excavating equipment;
- b) classifications of standard land excavators;
- c) a power shovel;
- d) a front-end loader;
- e) a backhoe;
- f) a dragline;
- g) clamshells and grapples;
- h) a trencher;
- i) continuous bucket excavator.

19. Discuss with your group mates or in pairs what a universal excavator is.

20. Choose a standard land excavator and make a presentation.

UNIT 10

CONSTRUCTION EQUIPMENT: EXCAVATING EQUIPMENT (Combination Excavating-Hauling Units and Dredges)

Pre-reading tasks

1. Study the terms.

- | | |
|-------------------------------------|-----------------------------|
| a) combination excavator and hauler | выемочно-погрузочная машина |
| combination excavating-hauling unit | выемочно-погрузочная машина |
| dozer | бульдозер |
| self-loading scraper | самозагружающийся скрепер |
| elevating scraper | скрепер-элеватор |
| bucket loader | ковшовый погрузчик |
| bucket excavator | ковшовый экскаватор |
| suction dredge | землесосный снаряд |
| barge | баржа |
| b) bowl | бункерный ковш |
| blade | отвал, нож |
| ripper | рыхлитель |
| tooth (pl. teeth) | зуб (мн. ч. зубья) |
| cutter head | режущая головка |
| cutter | фреза |
| plate | пластина |
| suction pipe | грунтоприёмник |
| opening | отверстие |
| c) rock | каменная порода |
| broken rock | щебень |
| dirt | грунт |

d) curved
heavy

изогнутый
1) тяжёлый; 2) крупный,
большой

2. Use the dictionary to translate the words.

to push
to pull

to break up
to handle

downward
upward

3. Match the equivalents:

- | | |
|--|---|
| 1) dumping area | a) засасывать воду и взвешенную в ней землю |
| 2) to pump into barges | b) сгребать грунт |
| 3) tractor power | c) со стороны днища |
| 4) to churn up the bottom | d) мощность тягача |
| 5) to pipe to land | e) закачивать на баржи |
| 6) to scoop up dirt | f) разворотить дно |
| 7) to move the dirt out through | g) место сброса отходов |
| 8) to loosen soil | h) рыхлить почву |
| 9) at the bottom end | i) выталкивать грунт через |
| 10) to suck up water and the earth suspended in it | j) транспортировать по трубопроводу на сушу |

Reading task

4. Read the text carefully.

Standard land excavators that pick up and transport the materials are called **combination excavators and haulers**. They include such machines as bulldozers, scrapers, self-loading or elevating scrapers, and sometimes the front-end loaders.

A **bulldozer** is a curved blade mounted at the front of a crawler or rubber-tired tractor for digging and pushing earth and broken rock from one place to another. It is often used together with a ripper – a heavy tooth or a series of teeth mounted at the rear of a tractor to break up rock so that it can be handled by the dozer. Because the size of the blade limits

the amount of the dirt the dozer can move at one, it is not economical to use the dozer for moving dirt more than a few hundred feet.

A **front-end loader** is sometimes used for moving dirt in the same manner as the dozer, and with the same limitations.

A **scraper** is the most economical of the combination excavating-hauling units for hauls of over a few hundred feet. A scraper is a wheel-mounted, open-topped box called a “bowl”. It has a hinged bottom that is lowered to scoop up dirt as the machine moves forward. When the bowl is full, the bottom is closed and the unit is moved to the dumping area, where the bottom is lowered and a hydraulic unit pushes in the back of the bowl and moves the dirt out through the opening in the bottom. Scrapers are pulled by tractors, most of which are an integral part of the unit.

Self-loading or **elevating scrapers** are a group of machines that does the same work as the conventional scraper, but in front of the bowl is a series of horizontal plates mounted on moving chains. The chains move and the plates lift the dirt into the bowl in the same manner as a bucket loader. The advantage of the elevating scraper is that it needs less tractor power for loading operation.

Besides land excavators, excavating equipment also includes dredges. **Dredge** is an excavating machine mounted on a barge or boat. Two common types are similar to land excavators – the clamshell and the bucket excavators. The **suction dredge** is different; it has a movable suction pipe which can be lowered to the bottom, usually with a fast-moving cutter head at the bottom end. The cutter churns up the bottom so that the pumps on the barge or boat suck up water and the earth suspended in it. Then the pumped material is piped to land. When the distance to land is too great the material is pumped into barges.



(a)



(b)



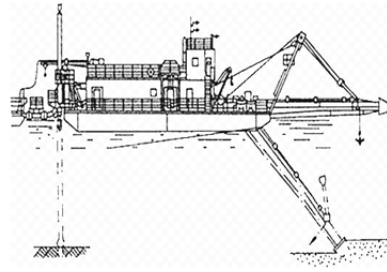
(c)

Figure 1. Combination excavators and haulers.

(a) Conventional scraper. (b) Self-loading scraper. (d) Bulldozer



(a)



(b)

Figure 2. Dredges. (a) Backhoe dredge. (b) Suction dredge

Comprehension check

5. Continue the phrases.

1. A bulldozer is a curved blade mounted at the front of the crawler or rubber-tired tractor for...
2. A front-end loader is sometimes used for...
3. Combination excavators and haulers include such machines as...
4. Dredge is an excavating machine mounted on...
5. Scrapers are pulled by...
6. Self-loading or elevating scrapers are a group of machines that does the same work as the conventional scraper, but...
7. The advantage of the elevating scraper is that...
8. The cutter churns up the bottom so that the pumps on the barge...
9. When the bowl is full, ...

6. Insert the missing words.

1. A ... is the most economical of the combination excavating-hauling units for hauls of over a few hundred feet.
2. A bulldozer is often used together with a ... , mounted at the rear of a tractor to break up rock.
3. A front-end loader is sometimes used for moving dirt in the same manner as ... , but with the same limitations.
4. A scraper has a ... that is lowered to scoop up dirt as the machine moves forward.

5. A scraper is ... called a "bowl".
6. Because ... , it is not economical to use the dozer for moving dirt more than a few hundred feet.
7. Scrapers are pulled by ... , most of which are an integral part of the unit.
8. Standard land excavators that ... are called combination excavators and haulers.
9. The chains move and the plates ... in the same manner as a bucket loader.
10. The suction dredge has ... which can be lowered to the bottom, usually with a fast-moving cutter head at the bottom end.

7. State whether the statements are true or false. Correct if necessary.

1. A dozer is used for pulling dirt and rock.
2. A dredge is similar to a clamshell or a bucket excavator.
3. A front-end loader can be used instead of a scraper.
4. A front-end loader is never used for moving dirt.
5. A ripper is a heavy tooth or a series of teeth mounted at the rear of a tractor.
6. A suction pipe is an integral part of a dredge.
7. A suction pipe usually has a fast-moving cutter head at its bottom end.
8. Standard land excavators that pick up and transport the materials are called combination elevators and haulers.
9. There are moving chains with horizontal plates mounted on an elevating scraper.
10. Tractors are pulled by scrapers.

8. Answer the questions.

1. What machines are called combination excavators and haulers?
2. What are the main tools of a bulldozer? What are their functions?
3. Why is it sometimes not economical to use a bulldozer? What is more economical to use instead in such cases?
4. Does a front-end loader move dirt in the same manner as a dozer or a scraper?

5. What equipment has a bowl? What is the function of the bowl?
6. What is the main difference between a conventional scraper and a self-loading scraper? A clamshell/backhoe dredge and a suction dredge?

Vocabulary practice

9. Complete the text using the words from the list below.

- | | | | |
|----------------|-------------|----------|-------------|
| (a) excavation | (b) place | (c) land | (d) backhoe |
| (e) performed | (f) shallow | (g) bank | (h) mounted |
| (i) loaded | (j) filled | | |

Dredging is an (1) ... usually (2) ... at least partly underwater, in shallow seas, rivers or lakes to gather up bottom sediments and (3) ... them at a different location. A backhoe dredge has a (4) ... like on some excavators. It can be made by mounting a (5) ... backhoe excavator on a pontoon. The bucket is (6) ... moving towards the machine. The largest backhoe dredges in the world are barge-(7) ... excavators. Small backhoe dredges can be track-mounted and work from the (8) Usually dredged material is (9) ... in barges. This machine is mainly used in harbors and other (10) ... water.

Note:

bottom sediments донные наносы

10. Complete the text translating the words in brackets.

A bulldozer is a crawler or rubber-tired tractor. Its primary tools are (1) ... (**отвал**) at the front and (2) ... (**рыхлитель**) at the rear. The blade is a (3) ... (**большая**) metal plate. It is used to (4) ... (**толкать**) large quantities of (5) ... (**грунт**), sand, (6) ... (**гравий**), or other such material. The ripper looks like a claw. It is used to loosen (7) ... (**плотные**) materials.

Bulldozers can be found on construction sites, mines and quarries, military bases, heavy industry factories, and farms.

The term 'bulldozer' is often used by mistake to mean any (8) ... (**тяжёлое оборудование**) (sometimes a (9) ... (**погрузчик**) and some-

times (10) ... (экскаватор)), but the term refers only to a tractor (usually tracked) (11) ... (оборудованный) with a dozer blade.

Note:

claw	КОГОТЬ
to refer	ОТНОСИТЬСЯ

11. Match the words with their definitions.

(a) *bulldozer* (b) *suction dredge* (c) *scraper*
(d) *dredge* (e) *front-end loader*

1. A machine for removing earth by a suction pipe.
2. A machine that removes earth from the bottom of a lake, river, etc. by buckets.
3. A machine with a vertically moveable bowl at the rear and a sharp horizontal cutter at the front.
4. A powerful and heavy vehicle that has a large curved piece of metal at its front and is used for pushing dirt and rock.
5. A tractor with a front-mounted square wide bucket connected to the end with two arms to scoop up loose material and move it from one place to another without pushing the material across the ground.

Writing Practice

12. Translate the text in a written form.

Excavators are heavy construction equipment consisting of a boom, a handle, a bucket and a cab on a rotating platform. The platform is mounted on the undercarriage with tracks or wheels.

A cable-operated excavator uses winches and steel ropes to move. Hydraulic fluid, hydraulic cylinders and hydraulic motors help a hydraulic excavator to move and perform all functions.

Modern hydraulic excavators have a wide variety of sizes. The smaller ones are called mini or compact excavators.

Before the 1990s, all excavators had a long counterweight at the rear of the machine to provide more digging force and lifting capacity. But to use such a machine was easy only in open areas. In 1993 'Yanmar' developed the world's first Zero Tail Swing excavator, which counter-

weight stays inside the width of the tracks. Such a design made the excavator safer and more user friendly in a confined space. This type of machine is now widely used throughout the world.

Language focus

13. Match the synonyms.

1) conventional; 2) loading scraper; 3) heavy; 4) front; 5) dozer;
6) earth; 7) self-combination excavator and hauler

a) common; b) rear; c) bulldozer; d) dirt; e) large; f) elevating scraper;
g) combination excavating-hauling unit

14. Match the antonyms.

1) push; 2) top; 3) front; 4) heavy; 5) curved

a) bottom; b) back; c) pull; d) straight; e) small

15. Guess what words were used to make up the nouns below and translate them:

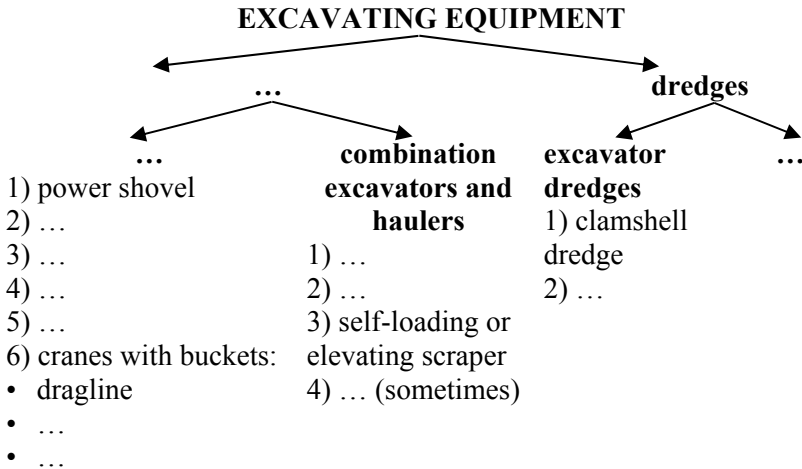
Scraper, excavator, dredge, loader, crawler, bulldozer, cutter, ripper.

Writing Practice

16. Write a short paragraph summarizing the text (ex. 12).

Summarizing

17. Fill in the diagram using the information from Units 10 and 11. Speak on the types of excavating equipment. Use the words: *consist of, include, are divided into*.



18. Think and speak on:

- classifications of combination excavating-hauling equipment;
- bulldozers and front-end loaders;
- conventional and self-loading scrapers;
- dredges and suction dredges.

19. Discuss with your group mates or in pairs advantages and disadvantages of various types of combination excavators and haulers.

20. Choose a combination excavator and hauler or a dredge and make a presentation.

UNIT 11

CONSTRUCTION EQUIPMENT: HAULING EQUIPMENT, GRADERS AND PAVERS

Pre-reading tasks

1. Study the terms.

- | | |
|----------------------|--------------------------------------|
| a) hauling equipment | доставочное оборудование |
| wheeled vehicle | колёсное транспортное средство |
| dumping truck | грузовик-самосвал |
| over-the-road truck | грузовик для эксплуатации на дорогах |
| off-the-road truck | внедорожный грузовик |
| concrete-mixer truck | автобетономеситель |
| grader | грейдер |
| paver | дорожный укладчик |
| asphalt paver | асфальтоукладчик |
| concrete paver | бетоноукладчик |
| vibrator | вибрационный уплотнитель |
| b) leveling blade | планировочный отвал |
| tamping pad | трамбующий брус |

2. Use the dictionary to translate the words.

to place

to smoothen

to compact

3. Match the equivalents.

- | | |
|---------------------------------|-----------------------------|
| 1) fine-grading | a) на крутых откосах |
| 2) paving materials | b) ровная земля |
| 3) at the edge of steep slopes | c) грузоподъёмность |
| 4) level earth | d) дорожные материалы |
| 5) maintenance | e) черновое профилирование |
| 6) articulated main frame | f) уплотнять материалы |
| 7) carrying capacity | g) планировка (грунта) |
| 8) to consolidate the materials | h) сочленённая главная рама |

- | | |
|---|--|
| 9) highway construction | i) строительство автомагистралей |
| 10) rough grading | j) содержание, текущий ремонт |
| 11) to provide extremely accurate surface elevation | k) обеспечивать чрезвычайно точную высоту покрытия |

Reading task

4. Read the text carefully

The most common **hauling equipment** is the self-propelled rubber-tired rear-dumping *trucks*. These trucks can be over-the-road or off-the-road. The main difference between these two types is weight and carrying capacity. Off-the-road trucks are more powerful. In special cases side-dumping trucks are also used. *Concrete-mixer trucks* mix and transport concrete from a factory to the construction site. *Conveyors* are not usually used on construction jobs for hauling excavated materials great distances. But if the jobs are large and it is not possible for trucks to pass, conveyors are very useful.

Graders are wheeled vehicles that mount a leveling blade between the front and rear wheels. The main use is fine-grading relatively loose and level earth. Though a grader is usually used for maintenance, it is an important machine in highway construction. Some models have an articulated main frame for faster turns of shorter radiuses and for safer operation at the edges of steep slopes.

Pavers place, smoothen, and compact paving materials. They may be mounted on rubber tires or crawler tracks. *Asphalt pavers* have tamping pads that consolidate the materials. *Concrete pavers* use vibrators for the same purpose. Many high-speed pavers have automated control devices that provide extremely accurate surface elevation.



(a)



(b)



(c)

Figure 1. Trucks. (a) Over-the-road truck. (b) Off-the-road truck. (c) Grader



(a)



(b)

Figure 2. (a) Asphalt paver. (b) Concrete paver

Comprehension check

5. Continue the phrases.

1. Asphalt pavers have tamping pads that...
2. Concrete-mixer trucks mix and transport concrete...
3. Conveyors are not usually used on construction jobs for...
4. Graders are wheeled vehicles that mount...
5. Many high-speed pavers have automated control devices that...
6. Pavers may be mounted on...

7. Some models have an articulated main frame for...
8. The main difference between over-the-road and off-the-road trucks is...
9. The most common hauling equipment is...
10. Though a grader is usually used for maintenance, it is an important machine in...

6. Insert the missing words.

1. Concrete pavers use ... to consolidate the materials.
2. ... is an important machine in highway construction.
3. But if ... , conveyors are very useful.
4. In special cases ... trucks are also used.
5. Many ... have automated control devices that provide extremely accurate surface elevation.
6. Off-the-road trucks are ... than over-the-road ones.
7. Pavers ... paving materials.
8. Some models of graders have ... for faster turns of shorter radiuses and for safer operation at the edges of steep slopes.
9. The main use of graders is ... relatively loose and level earth.

7. State whether the statements are true or false. Correct if necessary.

1. Concrete-mixer trucks mix and transport concrete from a construction site to the factory.
2. Conveyors are very useful if the jobs are large and it is impossible for trucks to pass.
3. Graders are used for maintenance and in highway construction.
4. Graders place, smoothen, and compact paving materials.
5. Over-the-road trucks are more powerful than off-the-road trucks.
6. Pavers are mounted on rubber tracks or crawler tires.
7. Pavers cannot provide accurate surface elevation.
8. Side-dumping trucks are used in any cases.
9. Some graders have a hinged main frame.
10. The most common hauling equipment is self-propelled rubber-tired side-dumping trucks.

8. Answer the questions.

1. Hauling equipment includes dumping trucks, concrete-mixer trucks and conveyors, doesn't it?
2. What is the difference between over-the-road and off-the-road trucks?
3. Are graders used for fine-grading loose earth or hard rock?
4. What are concrete-mixer trucks used for?
5. Where are conveyors the best to use?
6. What operations can pavers do?
7. What kinds of pavers do you know?
8. In what way do asphalt pavers and concrete pavers differ?
9. Do automated control devices of many high-speed pavers provide extremely accurate surface elevation?
10. Conveyors are not usually used on construction jobs for hauling excavated materials great distances, are they?

Vocabulary practice

9. Complete the text using the words from the list below.

- | | | | |
|-------------------|--------------------|-----------------------|-------------------------|
| (a) <i>bulk</i> | (b) <i>rear</i> | (c) <i>hydraulics</i> | (d) <i>construction</i> |
| (e) <i>front</i> | (f) <i>side</i> | (g) <i>hydraulic</i> | (h) <i>unloading</i> |
| (i) <i>dumped</i> | (j) <i>tractor</i> | | |

A dumping truck is a truck used for transporting (1) ... material (such as sand, gravel, or dirt) for (2) A typical dumping truck has an open-box bed, which is hinged at the rear and equipped with pistons to lift the (4) ... , allowing the material in the bed to be (5) ... on the ground behind the truck at the site of delivery. Today, virtually all dumping trucks operate by (6) ... and come in various configurations.

A side-dumping truck consists of a 3-axle (7) ... pulling a 2-axle semi-trailer. The main advantage of this truck is rapid (8) In addition, unlike (9) ... -dumping trucks it is almost impossible for a (10) ... -dumping truck to tip over while dumping.

Note:

open-box bed	платформа
semi-trailer	полуприцеп
to tip over	опрокидываться

10. Complete the text translating the words in brackets.

A grader is a construction machine with a long (1) ... (**планировочный отвал**) used to create a (2) ... (**ровная**) surface during grading. Typical models have three (3) ... (**оси**). The (4) ... (**двигатель**) and the (5) ... (**кабина**) are situated above the (6) ... (**задние**) axles at one end of the vehicle. A third axle is at the (7) ... (**передний**) end of the (8) ... (**транспортное средство**). The blade is between them. In some countries almost every grader (9) ... (**оборудован**) with a second blade that is placed in front of the front axle. Some construction workers call this machine “the blade”. Some graders can be used for underground mining.

In civil engineering, the grader’s task is (10) ... (**планировка**) the “rough grading” performed by (11) ... (**тяжёлое**) equipment such as (12) ... (**скреперы**) and (13) ... (**бульдозеры**).

Graders are usually used in the construction and (14) ... (**текущий ремонт**) of dirt roads and gravel roads. In the construction of paved roads they are used to make a wide flat surface on which later asphalt (15) ... (**укладывается**). Graders can make inclined surfaces to give camber to the roads.

A recent innovation in the design of graders is using GPS (15) ... (**технология**) for better grade control.

Note:

underground mining	подземные горные работы
dirt road	грунтовая дорога
gravel road	гравийная дорога
paved road	дорога с покрытием
camber	выпуклость
grade control	контроль уклона

11. Match the words with their definitions.

- (a) conveyor (b) paver (c) truck
(d) grader (e) concrete-mixer truck

1. Construction equipment used to lay asphalt or concrete on roads, bridges, etc.
2. A construction machine with a long blade used to create a level surface.

3. A moving belt that transports objects.
4. A self-propelled wheeled vehicle for hauling.
5. A truck-mounted machine with a large revolving drum for making and hauling concrete.

Language focus

12. Match the synonyms

- 1) elevation; 2) compact; 3) create; 4) extremely; 5) construction site
 a) make; b) job site/building site; c) consolidate; d) height; e) very

13. Match the antonyms.

- 1) over-the-road; 2) fine-grading; 3) paved road; 4) fast; 5) short
 a) rough-grading; b) gravel road; c) slow; d) long; e) off-the-road

14. Translate the following phrases paying attention to the underlined words that can be verbs, nouns, adjectives or adverbs without changing their form and adding suffixes.

1. to place concrete; Berlin is a very beautiful place
2. to control the time; to control hydraulically; automated control device; grade control
3. to level the ground; ground level; level ground

15. Arrange the words ending in *-er* according to the way they are formed; translate them.

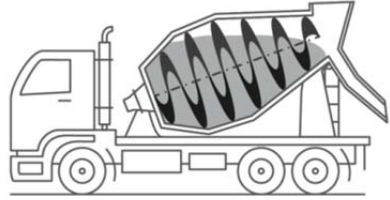
V + <i>er</i> → N	Adj + <i>er</i> → Adj

Better, crawler, deeper, faster, grader, later, mixer, paver, rubber, safer, shorter.

Writing Practice

16. Translate the text in a written form.

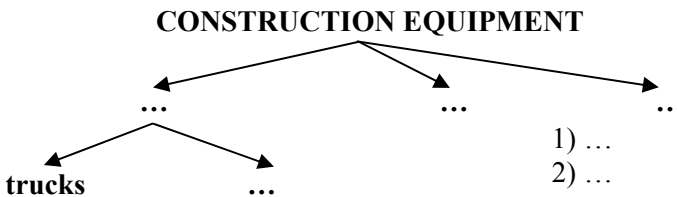
Concrete-mixer trucks haul and mix concrete from a factory to the building site. They have a drum mounted on a chassis. Dry materials and water are loaded into the drum and then the ingredients are mixed during transportation. The drum turns and the material stays liquid until delivery. Inside the drum there is a spiral blade. In one rotational direction, the concrete is pushed deeper into the drum. This is the direction that the drum is rotated while the concrete is being transported to the building site. When the drum rotates in the other direction, it forces the concrete out of the drum. From there it may go onto chutes to guide the concrete directly to the job site. If the truck cannot get close enough to the site to use the chutes, the concrete may be discharged into a concrete pump, connected to a flexible hose, or onto a conveyor belt. Buckets suspended from cranes are also used to place the concrete.



17. Write a short paragraph summarizing the text (ex. 4).

Summarizing

18. Fill in the diagram using the information from ex. 4. Speak on the types of excavating equipment. Use the words: *consist of, include, are divided into*.



- 1) ...
- 2) ...
- 3)

19. Think and speak on:

- a) trucks;
- b) concrete-mixer trucks;
- c) conveyors;
- d) graders;
- e) pavers.

20. Discuss with your group mates or in pairs advantages and disadvantages of various types of trucks.

21. Choose a hauling machine, a grader or a paver and make a presentation.

UNIT 12 SPECIALIZED CONSTRUCTION EQUIPMENT

Pre-reading tasks

1. Study the terms.

a) drilling equipment	буровое оборудование
compactor	уплотнитель
plate compactor	виброплита
jumping jack compactor	вибротрамбовка
roller	1) дорожный каток; 2) валец
road roller	дорожный каток
sheep-foot roller	1) кулачковый валец; 2) дорожный каток с кулачковым вальцом
pile hammer	свайный молот
vibratory hammer	вибромолот
hydraulic hammer	гидравлический молот
pavement profiler	дорожная фреза
drill	бур, буровая установка
auger	шнековый бур
bore tunneling machine	установка горизонтального направленного бурения
b) protrusion	выступ
hardened steel teeth	зубья из закалённой стали
eccentric cam	эксцентрикый кулачок
jacking ring	опорное кольцо
c) foundation	фундамент
cofferdam	ограждение котлована
supporting wall	несущая стена
pavement	дорожное покрытие
well	скважина
hole	отверстие
water pipe	водопроводная труба
sewer pipe	канализационная труба
utility pipe	труба инженерных коммуникаций

d) multiwheeled	многоколёсный
replaceable	заменяемый
conventional	обычный
rare	редкий
hand-held	переносной
intermediate	промежуточный

2. Use the dictionary to translate the words.

to activate	to compact	to contract	up to
to dewater	to support	means (n)	instead of
to drill	to expand		

3. Match the equivalents.

- | | |
|--|---|
| 1) to impart an impact to | a) устанавливать сваи |
| 2) to install piles | b) забивать сваи вибромолотом |
| 3) solid cylinder | c) проделывать отверстия |
| 4) to vibrate piles | d) ряды зубьев |
| 5) to cut holes | e) предыдущая секция |
| 6) underground | f) проникать в породу |
| 7) to pulverize pavement | g) литой цилиндр |
| 8) the section before | h) под действием силы тяжести |
| 9) rows of teeth | i) по окружности |
| 10) to range in size | j) передавать импульс на |
| 11) into place | k) под землёй |
| 12) because of the gravity | l) в проектное положение |
| 13) on the periphery | m) классифицироваться по размеру |
| 14) to penetrate rock | n) измельчать дорожное покрытие |
| 15) to drill holes for blasting, grouting, and exploring | o) бурить отверстия для взрывов, цементации грунта и исследования |

Reading task

4. Read the text carefully.

The most common specialized construction equipment is compactors, pile hammers, pavement profilers and drilling equipment.

Compactors are designed to consolidate earth and paving materials. They range in size from small pneumatic hand-held plate compactors and jumping jack compactors to multiwheeled machines weighing more than 50 tons. Compaction may be performed by heavily loaded rubber tires or steel rollers. The steel rollers may be solid cylinders, or have protrusions (sheep-foot roller).



Figure 1. (a) Hand-held plate compactor. (b) Jumping jack compactor



Figure 2. (a) Solid steel cylinder compactor. (b) Sheep-foot roller

Pile hammers are used to install piles for foundations, for supporting walls and cofferdams. Modern hammers are activated by steam, air, hydraulic fluid, or electricity. Conventional hammers have pistons. Steam, air, hydraulic fluid, or electricity raises the pistons, and then they fall freely because of gravity or the same means drives them downward to impart an impact to the pile. Vibratory hammers use electrically activated eccentric cams to vibrate piles into place. Relatively rare are hydraulic hammers that use hydraulic action to install piles.

Pavement profiler looks like a conventional motor grader, but instead of a blade it carries near its center a horizontal drum that has on its periphery many rows of replaceable hardened steel teeth. As the drum revolves, the teeth pulverize asphalt or concrete pavement to depths of up to 10 cm.



(a)



(b)

Figure 3. (a) Pile-driver. (b) Pavement profiler

Drilling equipment. Holes are drilled in rock for wells and for blasting, grouting, and exploring. Smaller drills may be hand-held, but for production work drills are mounted on masts which are supported by trucks, or special tracks. They are hydraulically or pneumatically controlled. **Augers** are used for drilling wells, dewatering, and cutting holes that can be filled with concrete for foundations. Augers up to 1.8 m in diameter are common. **Bore tunneling machine** places water, sewer or utility pipes accurately for great distances underground. It has a series of intermediate hydraulic jacking rings that expand or contract to permit any section of pipe to move independently from the sections before.



(a)



(b)



(d)



(e)

Figure 4. (a) Hand-held auger. (b) A loader with an attached auger.
(c) A crawler-mounted drill. (d) Bore tunneling machine

Comprehension check

5. Continue the phrases.

1. As the drum revolves,
2. Augers are used for
3. Bore tunneling machine has a series of intermediate hydraulic jacking rings that
4. Compactors are designed to
5. Compactors range in size from small pneumatic hand-held plate compactors and jumping jack compactors to
6. Holes are drilled in rock for
7. Modern hammers are activated by
8. Pavement profiler looks like a conventional motor grader, but
9. Pile hammers are used to install piles for
10. Steam, air, hydraulic fluid, or electricity raises the pistons, and then they fall freely because of
11. The most common specialized construction equipment is

6. Insert the missing words.

1. ... raises the pistons, and then they fall freely because of gravity or the same means drives them downward to impart an impact to the pile.
2. Augers up to ... in diameter are common.
3. Bore tunneling machine has ... that expand or contract to permit any section of pipe to move independently from the sections before.
4. Bore tunneling machine places ... accurately for great distances underground.
5. Conventional ... have pistons.
6. Drills are ... controlled.
7. Relatively rare are ... that use hydraulic action to install piles.
8. Smaller drills may be ..., but for production work drills are mounted on masts which are supported by trucks, or special tracks.
9. The ... may be solid cylinders, or have protrusions (sheep-foot roller).
10. Vibratory hammers use ... to vibrate piles into place.

7. State whether the statements are true or false. Correct if necessary.

1. A compactor's heavily loaded rubber tires or steel rollers perform compaction.
2. A pavement profiler carries a horizontal drum with many rows of steel teeth.
3. A sheep-foot roller is a type of a compactor.
4. As the drum revolves, the teeth pulverize asphalt or concrete pavement to depths of up to 100 cm.
5. Bore tunneling machines are used for drilling wells, dewatering, and cutting holes that can be filled with concrete for foundations.
6. Compactors are used to install piles for foundations, for supporting walls and cofferdams.
7. Conventional pile hammers use electrically activated eccentric cams to install piles into place.
8. Drilling equipment is used for making wells, for blasting, grouting, and exploring.
9. Hydraulic pile hammers are common.
10. Pavement profilers look like a conventional motor scraper.

8. Answer the questions.

1. What machines does the most common specialized construction equipment include?
2. Where are compactors used?
3. Do compactors consolidate paving materials and earth?
4. What types of pile hammers are there?
5. How does a pile hammer work?
6. Are hydraulic hammers used rarely or often?
7. The pavement profiler and the grader look the same, don't they? Why?
8. How can drills be controlled?
9. Do augers place water, sewer or utility pipes for great distances underground?
10. How do intermediate hydraulic jacking rings work in a bore tunneling machine?

Vocabulary practice

9. Complete the text using the words from the list below.

- | | | | |
|----------------------|-------------------|------------------------------------|-------------------|
| (a) <i>pneumatic</i> | (b) <i>walls</i> | (c) <i>machine</i> | (d) <i>bridge</i> |
| (e) <i>suspended</i> | (f) <i>hammer</i> | (g) <i>machinery</i> | (h) <i>steel</i> |
| (i) <i>destroy</i> | (j) <i>holes</i> | (k) <i>structures and pavement</i> | |

Demolition (1) ... is used to demolish (2) Construction *crews* often use a (3) ... demolition ball to smash (4) The ball is (5) ... from a crane that swings it against a building. The (6) ... on a small pile-driving (7) ... can be dropped to break up floors and pavement. Hard objects can be broken up with (8) ... or other types of drills. These drills also make (9) ... that crews pack with explosives to (10) ... an entire building or (11)

Note:

crew	бригада
demolition ball	ядро для разрушения зданий
to swing against	раскачивать в сторону
floor	перекрытие
explosives	взрывчатка

10. Complete the text translating the words in brackets.

(1) ... (**Уплотнители**) are normally hydraulically powered and (2) ... (**классифицируются по**) shapes and (3) ... (**размеру**). In (4) ... (**строительстве**) there are three main types of compactors: the (5) ... (**виброплита**), the (6) ... (**вибротрамбовка**) and the (7) ... (**дорожный каток**). The roller type compactors are used for compacting crushed rock as the base layer for (8) ... (**бетонных**) or stone (9) ... (**фундаментов**). The plate compactor has a large vibrating plate and is used for creating a (10) ... (**ровный**) grade, while the jumping jack compactor has a smaller foot. The jumping jack compactor is usually used to (11) ... (**трамбовать**) narrow (12)... (**траншеи**) for water or gas supply (13) ... (**трубопроводы**), etc. Road rollers may also have vibrating (14) ... (**валыцы**) or (15) ... (**кулачковые валыцы**).

11. Match the words with their definitions.

(a) *jumping jack compactor*

(b) *plate compactor*

(c) *sheep-foot roller*

(d) *pile hammer*

(e) *drilling equipment*

(f) *road planer*

1. A compactor with many protrusions on the roller.
2. A construction machine for driving piles.
3. A construction machine used to remove asphalt or concrete pavement from roadways.
4. A construction machine usually used to compact the bottom of trenches.
5. A hand-held compactor with a metal plate used to compact sand, earth, etc.
6. Equipment used to bore holes in rock.

Language focus

12. Match the synonyms.

- 1) pile hammer; 2) consolidate; 3) install piles; 4) periphery;
- 5) pulverize

- a) demolish/destroy/break up; b) drive piles; c) pile driver; d) centre;
- e) compact

13. Match the antonyms.

1) expand; 2) fall; 3) raise; 4) dewater; 5) different; 6) pulverize;
7) rarely; 8) rare

a) the same; b) build; c) water; d) rise; e) contract; f) drop; g) often;
h) common

14. Translate the following words into Russian paying attention to the underlined words that can be verbs, nouns, adjectives or adverbs without changing their form and adding suffixes.

1. water well; to drill a well; to know mechanics well
2. to drill a hole; an electric drill
3. a hydraulic hammer; to hammer a pile; a Hammer is a large off-road vehicle
4. underground water; to place pipes underground; in London metro is called the Underground

Writing Practice

15. Translate the text in a written form.

A pile hammer is a mechanical device used for driving piles into soil to provide foundation support for buildings or other structures.

A traditional type of pile hammer includes a heavy weight between guides so that it can freely slide up and down in a single line. It is placed upon a pile. The weight is raised by hydraulic fluid, steam, diesel, or manually. When the weight reaches its highest point it is then released and smashes on to the pile in order to drive it into the ground.

Note:

guides	направляющие
to slide	скользить

16. Write a short paragraph summarizing the text (ex. 4).

Summarizing

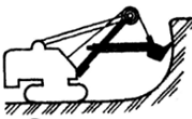
17. Think and speak on:

- a) compactors;
- b) pile hammers;
- c) pavement profilers;
- d) drilling equipment;
- e) demolition equipment.

18. Discuss with your group mates or in pairs advantages and disadvantages of various types compactors and drilling equipment.

19. Match the construction equipment with its name using the information from Units 8–12:

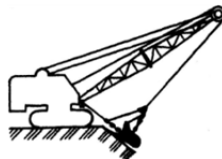
- 1) backhoe
- 2) clamshell
- 3) crane
- 4) dragline
- 5) hydraulic hammer
- 6) front-end loader
- 7) pile hammer
- 8) power shovel



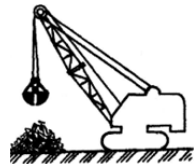
(a)



(b)



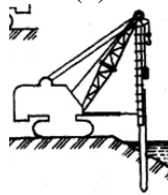
(c)



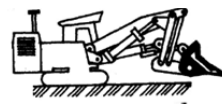
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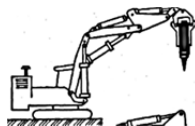
(e)



(f)



(g)



(h)

UNIT 13 PUMPS AND PUMPING MACHINES

Pre-reading tasks

1. Study the terms.

- | | |
|--|--|
| a) fluid
liquid
conducting liquid
fluid machinery
pumping machinery
pump
mechanical pump
electromagnetic pump
centrifugal pump
displacement pump
conduction pump
induction pump | 1) флюид, текучая среда; 2) жидкий
1) жидкость; 2) жидкий
проводящая жидкость
пневмооборудование
насосное оборудование
насос
механический насос
электромагнитный насос
центробежный насос
объёмный насос
кондукционный насос
индукционный насос |
| b) piston
shaft
shaft seal
electric motor
rotor circuit
permanent magnet | поршень
вал (механизма)
уплотнение вала
электродвигатель
(электрическая) цепь ротора
постоянный магнит |
| c) current
magnetic field | электрический ток
магнитное поле |
| d) elevation
pipeline
reservoir
well
power plant
atomic energy power plant
chemical plant
refinery | высота (над уровнем моря)
трубопровод
водохранилище
колодец; нефтяная скважина
электростанция
атомная электростанция
химический завод
нефтеперерабатывающий завод |

reactor
generator
hydraulic system

реактор
генератор
гидравлическая система

2. Use the dictionary to translate the words.

to circulate
to transfer
to press
to pass

to rotate
to deliver
to drive
to align

to increase
to convert
to supply

3. Match the equivalents.

- 1) at higher pressure
- 2) at enormous pressures
- 3) moving part of the pump
- 4) by direct contact with
- 5) source of energy
- 7) stream of water or oil
- 8) cooling water
- 9) to transport through pipes
- 10) to produce magnetic field
- 11) to drive a pump
- 12) to act directly on the fluid
- 13) to deliver through pipelines
- 14) to raise oil to the surface
- 15) to circulate water to generator
- 16) to impart energy to the fluid
- 17) to apply current through metals
- 18) to convert energy into pressure

- a) при огромном давлении
- b) источник энергии
- c) поток воды или масла
- d) при более высоком давлении
- б) охлаждающая вода
- e) подвижная часть насоса
- f) перемещать по трубам
- g) приводить в движение насос
- h) пускать ток через металлы
- i) создавать магнитное поле
- j) доставлять по трубопроводу
- k) передавать воду в генератор
- l) превращать энергию в давление
- m) поднимать нефть на поверхность
- n) с помощью непосредственного контакта с
- o) сообщать энергию текучей среде
- p) напрямую воздействовать на текучую среду

Reading task

4. Read the text carefully.

Pumps are a kind of fluid machinery. A **pump** is a machine that transfers energy from a mechanical system to a fluid. The increase in energy helps to transport the fluid through pipelines, to store it at a higher pressure or to raise to a higher elevation.

A pump deep in a well may raise water or oil to the surface. At a ground level location a pump may deliver fluid to a nearby elevated reservoir or, through long pipelines, to a location at similar or different elevation. In a power plant, pumps circulate cooling water to generators at enormous pressures. In chemical plants and refineries pumps transfer various fluids into reactors at higher pressure. In hydraulic systems, pumps give energy to a moving stream of oil or water to move a piston or to rotate a shaft.

To drive a pump a source of energy is needed, such as an electric motor, a steam engine or a manual power.

Pumping machinery includes devices that move fluids from a lower to a higher elevation or from a place of lower pressure to one of higher pressure. Pumping machinery may be classified as mechanical or as electromagnetic.

Mechanical pumps. In mechanical pumps the fluid is transferred by direct contact with a moving part of the pumping machinery.

The two basic types are (1) centrifugal pumps, and (2) displacement pumps. **Centrifugal pumps** impart energy to the fluid by increasing its speed and then convert part of this energy into pressure. **Displacement pumps** act directly on the fluid, forcing it to flow against a higher pressure.

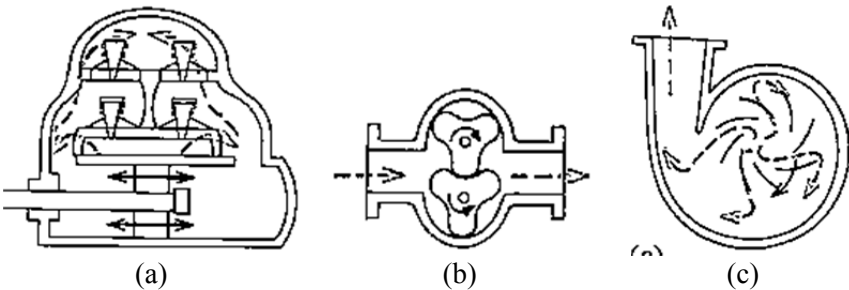


Figure 1. Mechanical pumps. (a), (b) Displacement pumps. (c) Centrifugal pumps

Electromagnetic pumps. Where direct contact between the fluid and the pumping machinery is undesirable, as in atomic energy power plants for circulating liquid metals electromagnetic pumps are used. There are no moving parts in these pumps; no shaft seals are required. The liquid metal passing through the pump becomes the rotor circuit of an electric motor.

The current is supplied through a conducting liquid. And two permanent magnets are arranged to produce magnetic field. The two magnetic fields try to align with each other. This causes the mechanical motion of the fluid.

The two basic types of electromagnetic pumps are *conduction pumps* and *induction pumps*.

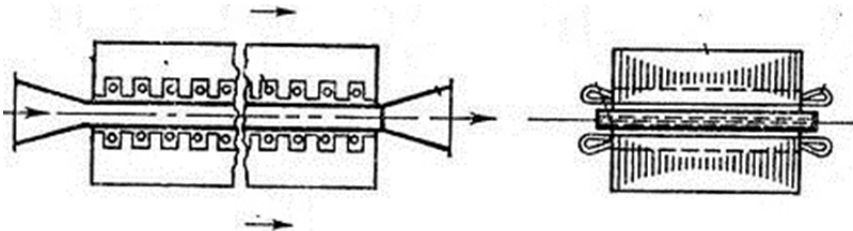


Figure 2. Electromagnetic pump

Comprehension check

5. Continue the phrases.

1. A pump is...
2. At a ground level location a pump may deliver fluid to...
3. In hydraulic systems, pumps give energy to...
4. In hydraulic systems, pumps give energy to...
5. In mechanical pumps the fluid is transferred by...
6. Pumping machinery includes devices that...
7. Pumping machinery may be classified as...
8. The current is supplied through...
9. Two permanent magnets are arranged to produce...

6. Insert the missing words.

1. A pump deep in a well may raise ... to the surface.
2. In ... pumps transfer various fluids into reactors at higher pressure.

3. In a power plant, pumps circulate ... to generators at enormous pressures.
4. In hydraulic systems, pumps give energy to ... to move a piston or press platen or to rotate a shaft.
5. In mechanical pumps ... is transferred by direct contact with a moving part of the pumping machinery.
6. Pumps are a kind of ... machinery.
7. The liquid metal passing through the pump becomes ... of an electric motor.
8. The two basic types of ... are conduction pumps and induction pumps.
9. There are no moving parts in electromagnetic pumps; no ... are required.
10. To drive a pump ... is needed, such as an electric motor or a steam engine.

7. State whether the statements are true or false. Correct if necessary.

1. A pump is a machine that transfers energy from a fluid to a mechanical system.
2. All pumps can be of three types.
3. Centrifugal pumps and displacement pumps are examples of mechanical pumps.
4. Centrifugal pumps and displacement pumps are two basic types of mechanical pumps.
5. Induction pumps and mechanical pumps are examples of electromagnetic pumps.
6. Pumps are a kind of liquid machinery.
7. Pumps move fluids from a place of higher pressure to one of lower pressure.
8. The liquid metal passing through the pump becomes the electric motor of a rotor circuit.
9. There are no moving parts in electromagnetic pumps.
10. To drive a pump a source of energy is needed, such as an electric motor or a steam engine.

8. Answer the questions.

1. What is the pump like?
2. Where can pumps be used?
3. What sort of energy is needed to drive a pump?
4. Are pumps used for moving liquids or gases?
5. What types of pumps are there?
6. How is the fluid transferred in mechanical pumps?
7. In what way do centrifugal pumps and displacement pumps differ from each other?
8. Where are electromagnetic pumps used?
9. What causes the mechanical motion of the fluid in an electromagnetic pump?

Vocabulary practice

9. Complete the text using the words from the list below.

- (a) *artificial* (b) *energy* (c) *fluids* (d) *manual*
(e) *natural* (f) *wells* (g) *work* (h) *sizes*

A pump is a device that moves (1) ... (liquids or gases) by mechanical action.

Pumps consume energy to perform mechanical (2) ... by moving the fluid. Pumps operate via many (3) ... sources, including (4) ... operation, electricity, engines, or wind power. Pumps come in many (5) ... , from microscopic for use in medical applications to large industrial pumps.

Mechanical pumps serve in a wide range of applications such as pumping water from (6) ... , aquarium filtering and aeration, in the car industry for water-cooling and fuel injection, in the energy industry for pumping oil and (7) ... gas. In the medical industry, pumps are used in developing and manufacturing medicine, and as artificial replacements for body parts, in particular the (8) ... heart.

Note:

applications	применение
filtering	фильтрация
aeration	аэрирование
water-cooling	водяное охлаждение
fuel injection	впрыск топлива

10. Complete the text translating the words in brackets.

(1) ... (**насос**) is a device that moves or compresses liquids or gases. Pumps are used in many machines and devices including home heating systems, refrigerators, oil (2) ... (**скважины**) and water (3) ... (**колодцы**), and turbojet and car (4) ... (**двигатели**). The (5) ... (**флюиды**) moved by pumps range from air for inflating bicycle tires to (6) ... (**жидкий**) sodium potassium for cooling nuclear (7) ... (**реакторы**). Most pumps (8) ... (**сделаны из**) steel but some – of glass or plastic. Gas pumps are also called compressors, fans, or blowers.

There are two major types of pumps: (9) ... (**механические**) and (10) ... (**электромагнитные**).

Note:

heating system	система отопления
turbojet	турбореактивный
inflating	накачивание
sodium potassium	сплав натрия-калий

11. Match the words with their definitions.

(a) gas (b) liquid (c) magnet
(d) power plant (e) refinery (f) chemical plant

1. A building for refining or processing oil.
2. A building or a group of buildings in which electricity for a large area is produced.
3. A piece of material that attracts certain metals (such as iron or steel).
4. A substance that flows freely like water.
5. A substance that is like air and has no fixed shape.
6. An industrial building where chemicals are produced.

Language focus

12. Match the synonyms.

- 1) fluid; 2) location; 3) elevation; 4) current; 5) transfer; 6) kind;
7) different; 8) source of energy
- a) height; b) various; c) liquid; d) type; e) place; f) electricity;
g) transport; h) power source

13. Match the antonyms.

1) higher; 2) different; 3) liquid; 4) electrical; 5) from; 6) enormous;
7) desirable

a) mechanical; b) hard; c) to; d) lower; e) similar; f) microscopic;
g) undesirable

14. a. Translate the following phrases into Russian paying attention to the underlined words that can be verbs, nouns or adjectives without changing their form and adding suffixes.

1. to pump fluid; to pump in, to pump off; oil pump
2. liquid substance; liquid crystal; liquid eyes; water is a liquid
3. the pump is powered by electricity; it gave the president much power; steam power; the power of the crane
4. a tomato plant; an auto plant; chemical plant; power plant; to plant trees

b. Fill in the table with Russian equivalents to the words from the phrases above.

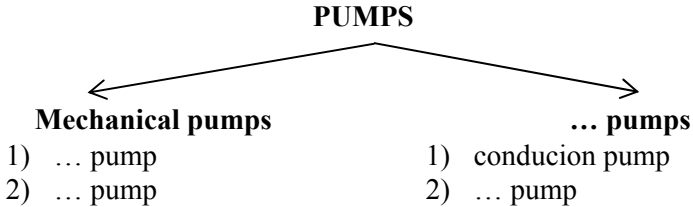
	Verb	Noun	Adjective
pump	работать насосом; качать	насос	—
liquid			
power			
plant			

Writing Practice

15. Write a short paragraph summarizing the text (ex. 9).

Summarizing

16. Fill in the diagram using the information from ex. 4. Speak on the types of pumping machinery Use the words: *consist of, include, are divided into, fall into.*



17. Think and speak on:

- a) what a pump is
- b) where pumps are used
- c) mechanical pumps
- d) electromagnetic pumps

18. Discuss with your group mates or in pairs the role of pumps in civilization development.

19. Choose a pump and make a presentation.

UNIT 14 POWER PLANTS

Pre-reading tasks

1. Study the terms.

- | | |
|-------------------------------|--|
| a) power plant | силовая установка |
| electric power plant | электросиловая установка |
| primary power | основной источник питания |
| secondary power | вспомогательный источник питания |
| b) steam | пар |
| gasoline | бензин |
| gas | газ |
| diesel | 1) дизельное топливо; 2) дизельный двигатель |
| c) external combustion engine | двигатель внешнего сгорания |
| internal combustion engine | двигатель внутреннего сгорания |
| gasoline engine | бензиновый двигатель |
| diesel engine | дизельный двигатель |
| steam engine | паровой двигатель |
| gas engine | газовый двигатель |
| turbine engine | газотурбинный двигатель |
| hydraulic motor | гидравлический двигатель |
| electric motor | электрический мотор |
| d) portable | переносной |
| stationary | стационарный |
| primary | основной |
| secondary | вспомогательный |
| evident | очевидный |

2. Learn to recognize international words. Give the Russian equivalents to the following words without a dictionary. Then compare your variants with the dictionary.

activate	gas	motor	site
compressor	generator	patent	stationary
dam	hydraulic	popular	turbine
diesel	locomotive	practical	virtually
electric	machine	pump	
experiment	mobility	scraper	

3. Use the dictionary to translate the words.

to appear	to activate
to increase	to experiment (<i>with</i>)

4. Match the equivalents.

- | | |
|-------------------------------|---|
| 1) marine applications | a) вращать генераторы |
| 2) increase in size | b) источник энергии |
| 3) engines of the piston type | c) основное требование |
| 4) with success | d) поршневые двигатели |
| 5) strip-mining operations | e) выдавать мощность |
| 6) to turn generators | f) электромеханическая транс-
миссия |
| 7) construction applications | g) увеличение в размере |
| 8) to provide power for | h) с успехом |
| 9) source of power | i) применение в строительстве |
| 10) electric wheel | j) применение на морских судах |
| 11) primary requirement | k) работы по добыче ископаемых
открытым способом |

Reading task

5. Read the text carefully.

Steam engine is seldom used as a source of power today except in some marine applications and rarely for pile driving.

Gasoline and *diesel engines* of the piston type are the most common source of power for construction machines. The diesel is getting more and more popular for at least two major reasons. First, the size of many construction machines has increased to proportions that earlier were thought impractical. With this increase in size, the economy of operation and maintenance of the diesel has become more important than greater initial cost. Second, the increased popularity of the diesel is explained by the fact that manufacturers have developed lightweight economical diesel engines of very small sizes and this has made it possible to use diesel engines in small compressors, pumps, portable electric power plants, and so on.

Electric motor is sometimes used as a primary power for some construction machines, but usually only at the site of large dams and strip-mining operations where mobility is not a primary requirement. Electricity is appearing as a secondary source of power on several types of mobile construction machinery, such as trucks and scrapers, which use diesel or gas engines to turn generators that provide power for electric wheels.

A more common type of secondary power is the *hydraulic motor*. It is activated by a gasoline or diesel-powered hydraulic pump and is used to provide power for virtually every movement, including travel, of construction machines.

Some manufacturers have experimented with *turbine engines* for construction applications. While they are being used with success as primary power sources for large stationary electric power plants on job sites, their practical use in mobile equipment is not evident.

Comprehension check

6. Continue the phrases.

1. A more common type of secondary power is...
2. First, the size of many construction machines has increased to proportions that earlier were thought...
3. Gasoline and diesel engines of the piston type are the most common source of power for...
4. Hydraulic motor is used to provide power for ... of construction machines.

5. Manufacturers have developed lightweight economical diesel engines of very small sizes and this has made it possible to use diesel engines in...
6. Second, the increased popularity of the diesel is explained by the fact that...
7. Steam is seldom used as a source of power today except...
8. The diesel is getting more and more popular for...
9. The practical use of turbine engines in mobile equipment is...
10. Electric motor is sometimes used as a primary power for some construction machines, but...

7. Insert the missing words.

1. ... are the most common source of power for construction machines.
2. Electricity is appearing as ... on several types of mobile construction machinery, such as trucks and scrapers.
3. Electricity is sometimes used as a primary source of power for some construction machines, but usually only at the site of ... where mobility is not a primary requirement.
4. Hydraulic motor is activated by ... and is used to provide power for virtually every movement, including travel, of construction machines.
5. Some manufacturers have experimented with ... for construction applications.
6. The diesel is getting ... for at least two major reasons.
7. The hydraulic motor is used to ... for virtually every movement of construction machines.
8. Trucks and scrapers use ... to turn generators that provide power for electric wheels.
9. While turbine engines are being used with success as primary power sources for, their practical use in mobile equipment is not evident.
10. With ... , the economy of operation and maintenance of the diesel has become more important than greater initial cost.

8. State whether the statements are true or false. Correct if necessary.

1. Electric motor is sometimes used as a primary power at the site of large dams and strip-mining operations.
2. Electricity is appearing as a secondary source of power on trucks and scrapers.
3. Electricity is used as a primary source of power only at the site of large dams and strip-mining operations.
4. Gasoline and diesel engines of the piston type are the most common source of power for construction machines.
5. Manufacturers have developed lightweight economical diesel engines of very small sizes that have made it possible to use diesel engines in small compressors, pumps, portable electric power plants, and so on.
6. Steam is often used as a source of power today.
7. The hydraulic motor is activated by a gasoline or diesel-powered hydraulic pump.
8. The practical use of turbine engines as primary power sources in mobile equipment is evident.
9. The turbine engine is getting more and more popular for at least two major reasons.
10. With the increase in size, the economy of operation and maintenance of the diesel has become more important than greater initial cost.

9. Answer the questions.

1. Steam, diesel, gasoline, electricity are sources of power, aren't they?
2. What kinds of engines and motors do you know? Where are they used?
3. What engines/motors are used as a primary power? A secondary power?
4. Which engine is getting more and more popular: the gasoline or the diesel one? Why?
5. Diesel engines are more economical in maintenance and operation, aren't they?
6. Are gasoline engines more expensive to build?
7. Can you guess the difference between a primary power and a secondary power? A motor and an engine?

Vocabulary practice

10. Complete the text using the words from the list below.

- (a) *electric motors* (b) *gasoline engines* (c) *chemical* (d) *air*
 (e) *diesel engines* (f) *steam engines* (g) *electrical* (h) *fuel*
 (i) *machine* (j) *motion* (k) *energy* l) *engine*

An (1) ... , or motor, is a (2) ... designed to convert one form of (3) ... into mechanical energy. Heat engines, including internal combustion engines (such as (4) ... and (5) ...) and external combustion engines (such as (6) ...) burn a (7) ... to create heat, which then creates a force. (8) ... convert (9) ... energy into mechanical (10) ... , pneumatic motors use compressed (11) ... and others – such as clockwork motors in wind-up toys – use elastic energy. In biological systems, molecular motors, like myosins in muscles use (12) ... energy to create forces and eventually motion.

Note:

pneumatic motor	пневматический двигатель
clockwork motor	заводной механизм
wind-up toy	заводная игрушка
elastic energy	упругая энергия
molecular motor	молекулярный двигатель
myosins	миозин

11. Complete the text translating the words in brackets.

Rudolf Diesel (1858–1913), a German (1) ... (**инженер-механик**), (2) ... (**разработал**) an internal combustion machine that used oil as (3) ... (**топливо**). Because of its simplicity of design and economy of its fuel, the (4) ... (**дизельный двигатель**) is often preferred to the (5) ... (**бензиновый двигатель**). It has greatly (6) ... (**увеличил**) the efficiency of (7) ... (**промышленность**) and transportation.

Diesel was born in Paris of German parents and got his (8) ... (**техническое**) education in Munich. He became interested in (9) ... (**проектирование**) an engine more efficient than (10) ... (**паровые двигатели**) and (11) ... (**газовые двигатели**). He based his work on the theory of heat engines and the designs of other engines. He patented his (12) ... (**конструкция**) in 1892, and had completed and operated the first successful diesel engine by 1897. He also founded a (13) ... (**завод**) to make diesel engines. In 1913, Diesel mysteriously disappeared from a German (14) ... (**корабль**) on the way to London.

Note:

Munich Мюнхен
heat engine тепловой двигатель

12. Match the words with their definitions.

(a) engine (b) turbine engine (c) diesel engine
(d) gasoline engine (e) hydraulic motor (f) electrical motor
(g) internal combustion engine

1. A device that converts electrical energy into mechanical energy, usually by employing electromagnetic phenomena.
2. A machine that changes energy (such as heat from burning fuel) into mechanical motion.
3. A motor that uses fluid power to do work.
4. A type of engine in which the fuel is burned within engine cylinders.
5. A type of engine that uses diesel fuel and that is used especially in large vehicles (such as trucks and buses).
6. An engine that uses burning gases to turn a turbine, or series of turbines, as a means of propelling the vehicle.
7. An internal combustion engine that burns gasoline and used in most automobiles.

Language focus

13. Match the synonyms.

- 1) motor; 2) motion; 3) piston; 4) convert; 5) lightweight; 6) seldom;
7) gasoline; 8) stationary; 9) tiny
a) mobile; b) cylinder; c) light; d) very small; e) petrol; f) rarely;
g) engine; h) movement; i) change

14. Match the antonyms.

- 1) primary; 2) economical; 3) external; 4) portable; 5) practical;
6) seldom; 7) appear; 8) tiny
a) huge; b) disappear; c) stationary; d) internal; e) often; f) secondary;
g) impractical; h) wasteful

15. Translate the following words into Russian paying attention to the underlined words that can be verbs, nouns, or adjectives without changing their form and adding suffixes.

1. source of power; primary power; to provide power for movements; power plant; to power a cableway
2. diesel engine; diesel is a kind of fuel; Diesel developed a new type of engine
3. to increase the size of construction machines; an increase in popularity

Writing Practice

16.a. Skim the text and insert the missed words.

b. Translate the text in a written form.

- (a) *diesel engine* (b) *electric motor* (c) *gasoline engine*
(d) *hydraulic motor* (e) *steam engine* (f) *engine*

(1) ... is a machine that converts energy into mechanical work. An engine may get its energy from such sources as fuels, steam, air or water under pressure.

(2) ... is a machine that uses steam to change the heat energy released by burning fuel into rotary or reciprocating motion that can do work. Large pumps, pile hammers, and many other kinds of powerful machines may also be driven by steam engines.

The development of the steam engine in the 1700s made modern industry possible.

(3) ... is an internal combustion engine that uses gasoline as a fuel. The motion inside the engine is transferred outside it to turn wheels and propellers or to operate machines. In this way, a gasoline engine turns heat energy into mechanical work.

Gasoline engines are compact and lightweight for the power they produce. This makes them one of the most important types of engines for vehicles. Gasoline engines may also be used as portable power plants – for example, to supply the power to run pumps and other machinery on farms.

(4) ... is a type of internal-combustion engine used mainly for heavy-duty work. Diesel engines drive huge trucks, large buses, tractors, and heavy road-making equipment. They are also used to power submarines and ships, and generators of electric power plants in small cities. Some motor cars are powered by diesel engines.

The diesel engine is named after Rudolf Diesel, the German engineer who invented it in 1890s.

(5) ... is a machine that changes electric power to do work. Electric motors are used to operate various machines and mechanisms. Such motors power machine tools, robots, and other equipment.

The size and capacity of electric motors vary greatly. An electric motor can be a tiny device that functions inside a wrist watch or a huge engine that powers a heavy locomotive.

There are two general types of electric motors, based on the type of electricity they use. They are alternating current (AC) motors; and direct current (DC) motors.

(6) ... is a machine that produces motion by means of pressure from water or some other fluid. This type of motor can be used to drive machinery or more heavy loads. Examples of hydraulic motors include jacks, hoists, and brake mechanisms of cars, and the control systems of aircraft.

There are two basic types of hydraulic motors. They are reciprocating motors, such as hydraulic lifts, and suction pumps; and turbines, such as those that turn electric generators.

Note:

alternating current (AC) motor	двигатель переменного тока
direct current (DC) motor	двигатель постоянного тока
jack	домкрат
aircraft	воздушное судно

17. Write a short paragraph summarizing the text (ex. 16).

Summarizing

18. Think and speak on:

- a) piston-type engines (gasoline engines and diesel engines);
- b) electric engines;
- c) hydraulic engines;
- d) turbine engines;
- e) Rudolf Diesel, the inventor of the diesel engine.

19. Discuss with your group mates or in pairs advantages and disadvantages of various types of engines and motors.

20. Choose an engine or a motor and make a presentation.

MECHANICAL ENGINEERING VOCABULARY (МАШИНОСТРОИТЕЛЬНЫЙ СЛОВАРЬ)

Short forms and symbols (Условные сокращения)

English

(a) – adjective	прилагательное
(adv) – adverb	наречие
(attr) – attributevely	в качестве определения
(conj) – conjunction	союз
(n) – noun	существительное
(pl) – plural	множественное число
(prep) – preposition	предлог
(v) – verb	глагол
AmE – American English	американский вариант английского языка
BrE – British English	британский вариант английского языка

Русские

лат.	латинский язык
см.	смотри
мн. ч.	множественное число

Phonetic Spelling (Фонетические замечания)

Vowels (Гласные)

i: see [si:]	ʊ put [pʊt]	aɪ five [faɪv]
ɪ sit [sɪt]	u: too [tu:]	aʊ now [naʊ]
e ten [ten]	ʌ cup [kʌp]	ɔɪ join [dʒɔɪn]
æ hat [hæt]	z: fur [fɜ:]	ɪə near [nɪə]
ɑ: arm [ɑ:m]	ə ago [ə'gəʊ]	eə hair [heə]
ɒ got [gɒt]	eɪ page [peɪdʒ]	ʊə pure [pjʊə]
ɔ: saw [sɔ:]	əʊ home [həʊm]	

Consonants (Согласные)

p	pen [pen]	f	fall [fɔ:l]	h	how [haʊ]
b	bad [bæd]	v	voice [vɔɪs]	m	man [mæn]
t	tea [ti:]	θ	thin [θɪn]	n	no [nəʊ]
d	did [dɪd]	ð	then [ðen]	ŋ	sing [sɪŋ]
k	cat [kæt]	s	so [səʊ]	l	leg [leg]
g	got [gɒt]	z	zoo [zu:]	r	red [red]
tʃ	chin [tʃɪn]	ʃ	she [ʃi:]	j	yes [jes]
dʒ	June [dʒu:n]	ʒ	vision [ˈvɪʒn]	w	wet [wet]

Аа

activate [ˈæktɪveɪt] (v) приводить в действие

activity [ækˈtɪvɪti] (n) деятельность, активность

actuate [ˈæktʃueɪt; -tʃʊ-] (v) приводить в действие

adapt [ədˈæpt] (v) (*to*) приспособлять, адаптировать

adaptation [ˌædæpˈteɪʃn] (n) адаптация, приспособление

advance [ədˈvɑːns] (v) продвигаться вперёд

advantage [ədˈvɑːntɪdʒ] (n) преимущество;

mechanical ~ [mɪˈkænikl ~] выигрыш в силе

align [əˈlaɪn] (v) выровнять(ся); синхронизировать(ся)

analyze [ˈænləaɪz] (v) анализировать, исследовать

angle [ˈæŋɡl] (n) угол

anticlockwise [ˈæntɪˈklɒkwaɪz] (a) движущийся против часовой стрелки; (adv) против часовой стрелки

appear [əˈpɪə] (v) появляться

application [ˌæplɪˈkeɪʃn] (n) применение; приложение (*силы*)

apply [əˈplai] (v) применять; прилагать (*силу*)

arm [ɑːm] (n) стрела

articulated [ɑːˈtɪkjʊleɪtɪd] (a) сочленённый

ascent [əˈsent] (n) подъём

attach [əˈtætʃ] (v) прикреплять

attachment [əˈtætʃm(ə)nt] (n) приспособление

auger [ˈɔːgə] (n) шнековый бур

availability [əˌveɪləˈbɪləti] (n) доступность, наличие

available [əˌveɪləˈbl] (a) (*for*) имеющийся в распоряжении

axe [æks] (n) топор

axle ['æksl] (n) 1) ось; 2) мост

Bb

backhoe ['bækhəʊ] (n) экскаватор типа «обратная лопата»

backwards ['bækwədʒ] (adv) назад

ball bearing ['bɔ:l 'beəriŋ] шарикоподшипник

bank [bæŋk] (n) берег

bar stock ['bɑ: 'stɒk] (n) прутковая заготовка

barge [bɑ:dʒ] (n) баржа

barrel ['bærəl] (n) бочка, бочонок

basic ['beɪsɪk] (a) основной, базовый

beam [bi:m] (n) балка

I- ~ [aɪ ~] балка двутаврового сечения

belt [belt] (a) лента; ремень

crawler ~ ['krɔ:lə ~] гусеничная лента

blade [bleɪd] (n) 1. отвал, нож

leveling ~ ['levəlɪŋ ~] 1) планировочный отвал; 2) лопасть

blast [blɑ:st] (v) взрывать

block [blɒk] (n) блок

pulley ~ ['pʊli ~] коробка блока

~ **and tackle** [~ ənd 'tækl] полиспаст (*система двух или нескольких блоков, соединённых тросом*)

bolt [bɒlt] (v) (*with*) скреплять болтами (с)

boom [bu:m] (n) стрела (*крана, экскаватора*); вылет стрелы

both ... and ... [bəʊθ ... ənd] (conj) и ..., и ...

bowl [bəʊl] (n) бункерный ковш

brake [breɪk] (n) тормоз

branch [brɑ:ntʃ] (n) отрасль

bridge [brɪdʒ] (n) мост

bucket ['bʌkɪt] (n) ковш, черпак (*экскаватора*)

hinged bottom ~ ['hɪn(d)zɪd 'bɒtəm ~] ковш с откидным днищем

bulk [bʌlk] (a) сыпучий

in ~ насыпью, россыпью

bulky ['bʌlki] (a) громоздкий

bulldoze ['bʊldəʊz] (v) разбивать крупные куски породы
bulldozer ['bʊldəʊzə] (n) бульдозер

Сс

cab [kæb] (n) кабина управления; кабина водителя (*автомашины*)

cable ['keɪbl] (n) кабель, проволочный канат, трос

cable-operated ['keɪbl 'ɒpəreɪtɪd] (a) с канатным приводом

cableway ['keɪblweɪ] (n) канатная дорога

capacity [kə'pæsəti] (n) мощность, производительность; грузоподъёмность

lifting ~ ['lɪftɪŋ ~] грузоподъёмность

hoisting ~ ['hɔɪstɪŋ ~] грузоподъёмность

carrying ~ ['kæriŋ ~] грузоподъёмность

car [kɑ:] (n) кабина лифта

~ **buffer** [~'bʌfə] буфер

carriage ['kæriɪdʒ] (n) каретка (*станка*); тележка (*крана*)

carrier ['kæriə] (n) 1) тягач; 2) транспортное средство

carry ['kæri] (v) 1) нести; 2) выдерживать (*нагрузку*)

caster ['kɑ:stə] (n) самоориентирующееся колесо

caterpillar ['kætəpɪlə] (n) гусеница; (attr) гусеничный

~ **tread** [~'tred] гусеничный ход

centre ['sentə] (n) центр

chain [tʃeɪn] (n) цепь;

link ~ ['lɪŋk ~] плосковзвонная цепь

roller ~ ['rɒlə ~] роликовая цепь

chair [tʃeə] (n) кронштейн

chassis ['ʃæsi] (n) (pl. **chassis** ['ʃæsi:z]) шасси

chemistry ['kemɪstri] (n) химия

chute [ʃu:t] (n) жёлоб

circuit control ['sɜ:kɪt kənt'rəʊl] (n) (электро)схема управления

circulate ['sɜ:kjʊleɪt] (v) циркулировать; передавать

clamshell ['klæmfel] (n) экскаватор с грейферным ковшом, грейфер

class [klɑ:s] (n) класс, разряд, категория

clockwise ['klɒkwaɪz] (a) движущийся по часовой стрелке; (adv) по часовой стрелке

cofferdam [ˈkɒfədæm] (n) ограждение котлована
cog [kɒɡ] (n) зубец шестерни
cogwheel [ˈkɒɡwi:l] (n) шестерня
coil [kɔɪl] (n) катушка; (v) наматывать, мотать; свёртывать
combination excavator and hauler [ˌkɒmbɪˈneɪʃn ˈɛkskəveɪtə ənd ˈhɔ:lə] выемочно-погрузочная машина
combine [kəmˈbaɪn] (v) 1) соединять(ся), смешивать; 2) комбинировать
compact [kəmˈpækt] (v) уплотнять
compactor [kəmˈpæktə] (n) уплотнитель
 jumping jack ~ [ˈdʒʌmpɪŋ ˈdʒæk ~] вибротрамбовка
 plate ~ [ˈpleɪt ~] виброплита (для уплотнения грунта, асфальта)
complex [ˈkɒmpleks] (a) сложный
concerned [kənˈsɜ:nd] (a) (*with*) связанный (с)
cone [kəʊn] (n) конус
confined [kənˈfaɪnd] (a) ограниченный
consist [kənˈsɪst] (v) (*of*) состоять (из)
consolidate [kənˈsɒlɪdeɪt] (v) уплотнять
construct [kənˈstrʌkt] (v) строить, сооружать, воздвигать; конструировать
construction [kənˈstrʌkʃn] (n) 1) сооружение, строительство, стройка; 2) здание, сооружение; 3) конструкция
constructional [kənˈstrʌkʃənl] (a) строительный, конструктивный, структурный
constructor [kənˈstrʌktə] (n) конструктор
continuous [kənˈtɪnjuəs] (a) непрерывного действия
contract [kənˈtrækt] (v) сжимать(ся)
control [kənˈtrəʊl] (n) контроль, управление
 automatic ~ [ˌɔ:təˈmætɪk ~] автоматическое управление
 electronic ~ [ˌɪlekˈtrɒnɪk ~] электронное управление
 pendant ~ [ˈpendənt ~] подвесной пульт управления
 remote ~ [rɪˈməʊt ~] дистанционное управление;
(v) контролировать, управлять
controller [kənˈtrəʊlə] (n) контроллер
conventional [kənˈvenʃənl] (a) обычный, привычный, общепринятый; традиционный
convert [kənˈvɜ:t] (v) (*into*) превращать (в)

conveyor [kən'veiə] (n) конвейер, транспортёр
bucket ~ ['bʌkɪt ~] ковшовый конвейер
screw ~ ['skru: ~] винтовой, шнековый транспортёр; шнек
belt ~ ['belt ~] ленточный транспортёр
cordage ['kɔ:dɪdʒ] (n) верёвки; такелаж
counterweight ['kaʊntəweɪt] (n) противовес, контргруз
course [kɔ:s] (n) курс;
core ~ ['kɔ: ~] (*in*) основной курс (учебной программы);
specialized ~ ['speʃəlaɪzd ~] (*in*) спецкурс
crane [kreɪn] (n) грузоподъёмный кран
aerial ~ ['eəriəl ~] летающий кран
bridge ~ ['brɪdʒ ~] мостовой кран
climbing ~ ['klaɪmɪŋ ~] самоподъёмный кран
crawler ~ ['krɔ:lə ~] кран на гусеничном ходу
derrick ~ ['derɪk ~] деррик(-кран)
floating ~ ['fləʊtɪŋ ~] плавучий кран
helicopter ~ ['helɪkɔptə ~] вертолёт-кран
gantry ~ ['dʒæntri ~] порталый кран, козловой кран
full-gantry ~ [fʊl 'dʒæntri ~] полный порталый кран
half-gantry ~ [hɑ:f 'dʒæntri ~] полупортальный кран
jib ~ [dʒɪb ~] стреловой кран, кран-укосина, консольный кран;
overhead travelling ~ ['əʊvəhed 'trævlɪŋ ~] подвижной порталый-
 ный кран
pillar ~ ['pɪlə ~] мачтовый кран
power ~ ['paʊə ~] кран с приводным двигателем
tower ~ ['taʊə ~] башенный кран
truck ~ ['trʌk ~] автомобильный кран
wall bracket ~ ['wɔ:l 'brækɪt ~] консольный кран (*на буровой*)
 (v) поднимать краном
crawl [krɔ:l] (v) ползти
create [kri:'eɪt] (v) создавать
crossbar ['krɒsbɑ:] (n) перекладина
current ['kʌrənt] (n) электрический ток
cut [kʌt] (v) (*cut, cut*) резать;
 ~ **holes** [~'həʊlz] проделывать отверстия

cutter ['kʌtə] (n) фреза
~ **head** [~'hed] режущая головка

Dd

dam [dæm] (n) плотина, дамба

deliver [di'livə] (v) доставлять

demolish [di'mɒlɪʃ] (v) разрушать; сносить

demolition [,dɒmə'liʃn] (n) разрушение; снос

depend [di'pend] (v) (*on*) зависеть (от)

deposit [di'pɒzɪt] (v) класть

derrick ['derɪk] (n) см. **Derrick crane**

guy ~ ['gaɪ ~] вантовый деррик-кран;

stiff-leg ~ ['stɪf'leg ~] жестконогий деррик-кран

descent [di'sent] (n) спуск; падение; (v) спускаться; падать

design [di'zain] (n) 1) чертёж; проект 2) дизайн; (v) проектировать; конструировать

designer [di'zainə] (n) конструктор, проектировщик

designing [di'zainɪŋ] (n) планирование, конструирование, проектирование

detect [di'tekt] (v) обнаруживать

determine [di'tɜ:mɪn] (v) определять

develop [di'veləp] (v) 1) развивать(ся); 2) разрабатывать

developer [di'veləpə] (n) разработчик

development [di'veləpmənt] (n) 1) развитие; 2) разработка, создание

device [di'vaɪs] (n) 1) устройство; 2) установка, агрегат; 3) механизм

clamping ~ ['klæmpɪŋ ~] стопорное устройство

control ~ [kən'trəʊl ~] механизм управления

speed-sensing ~ [,spi:d'sensɪŋ ~] датчик скорости

dewater [di:'wɔ:tə] (v) осушать

diesel [di:zl] (n) дизельное топливо

dig [dɪg] (v) (*dug, dug* [dʌg]) рыть, копать

digger ['dɪgə] (n) приспособление для копания; экскаватор

dirt [dɜ:t] (n) земля, почва, грунт

discharge [dɪs'tʃɑ:dʒ] (v) выгружать

discipline ['dɪsɪplɪn] (n) дисциплина (отрасль знания)

divided [di'vaɪdɪd] (a) измельчённый
downward ['daʊnwəd] (a) направленный вниз; (adv) вниз
dozer ['dəʊzə] (n) см. **Bulldozer**
drag [dræg] (v) тащить, волочить
dragline ['dræglain] (n) драглайн (канатный скрепковый экскаватор)
dredge [dredʒ] (n) драга, землечерпалка, экскаватор
 suction ~ ['sʌkʃn ~] землесосный снаряд
(v) производить дноуглубительные работы, углублять
drill [drɪl] (n) бур, буровая установка; (v) сверлить, бурить
drive [draɪv] (v) (*drove, driven* [drəʊv, drɪvn]) 1) приводить в движение; 2) вести, управлять; 3) вгонять, вбивать (сваи)
drop [drɒp] (v) бросать
drum [drʌm] (n) 1) барабан; 2) металлическая бочка
dumbwaiter ['dʌmweɪtə] (n) малый грузовой лифт, кухонный лифт (*для подачи блюд с этажа на этаж*), подъёмник книг (*в библиотеке*)
dump [dʌmp] (v) выбрасывать, вываливать; выгружать
dumping ['dʌmpɪŋ] (n) разгрузка
 end~ [,end~] нижняя разгрузка; (attr) с нижней разгрузкой
 side- ~ [,saɪd~] боковая разгрузка; (attr) с боковой разгрузкой

Ее

eccentric cam [ɪk'sentɪk 'kæm] эксцентриковый кулачок
effect [ɪ'fekt] (n) воздействие; (v) воздействовать
effectiveness [ɪ'fektɪvnis] (n) эффективность
effort ['efət] (n) усилие
either ... or ... ['aɪðə ... 'ɔː] (conj) или ..., или...
elbow ['elbəʊ] (n) локоть
electric [ɪ'lektrɪk] (a) электрический
 ~ **main** [~ meɪn] линия электропередач (ЛЭП)
electrical [ɪ'lektrɪkl] (a) электрический
electrician [ɪ,lek'trɪʃn] (n) электрик
electricity [ɪ,lek'trɪsɪtɪ] (n) электричество
electrify [ɪ'lektrɪfaɪ] (v) электрифицировать, снабжать электричеством
electronic [ɪ,lek'trɒnɪk] (a) электронный
electronics [ɪ,lek'trɒnɪks] (n) электроника

element ['elɪmənt] (n) элемент
elevate ['elveɪt] (v) поднимать
elevation [ˌeli'veɪʃn] (n) высота (*над уровнем моря*)
elevator ['elɪveɪtə] (n) лифт; подъёмник
 double-deck ~ [ˌdʌbl'dek ~] двухъярусный лифт
 express ~ [ɪk'spres ~] скоростной лифт
 freight ~ ['freɪt ~] грузовой лифт; грузоподъёмник
 hydraulic ~ [haɪ'drɔ:lɪk ~] гидравлический лифт
 geared traction ~ ['gɪəd 'trækʃn ~] электрический лифт с редукторной лебёдкой
 gearless traction ~ ['gɪələs 'trækʃn ~] электрический лифт с безредукторной лебёдкой
 observation ~ [ˌɒbzə'veɪʃn ~] панорамный лифт
 portable ~ ['pɔ:təbl ~] передвижной подъёмник
employ [ɪm'plɔɪ] (v) предоставлять работу; нанимать
enable [ɪ'neɪbl] (v) давать возможность
energy ['enədʒi] (n) энергия
 ~ **input** [ɪn'ɪnpʊt] (n) 1) подводимая энергия; 2) потребляемая энергия, затраты энергии
engine ['endʒɪn] (n) двигатель
 diesel ~ ['di:zl ~] дизельный двигатель
 gas ~ ['gæs ~] газовый двигатель
 gasoline ~ ['gæsəli:n ~] бензиновый двигатель
 internal combustion ~ [ɪn'tɜ:nl kəm'blʌstʃən ~] двигатель внутреннего сгорания
 steam ~ ['sti:m ~] паровой двигатель
 turbine ~ ['tɜ:bain; -ɪn ~] газотурбинный двигатель
engineer [ˌendʒɪ'nɪə] (n) инженер
 mechanical ~ [mɪ'kænikl ~] инженер-механик, машиностроитель (v) проектировать
engineering [endʒɪ'nɪərɪŋ] (n) 1) техника; 2) технология; 3) разработка, проектирование, конструирование; 4) машиностроение; 5) строительство
 aerospace ~ ['erəʊspeɪs ~] авиакосмическая техника
 automotive ~ [ˌɔ:tə'məʊtɪv ~] автотракторная техника
 chemical ~ ['kemɪkl ~] химическое машиностроение

civil ~ ['sɪvɪl ~] гражданское строительство
computer-aided ~ [kəm'pjʊtə,eɪdɪd ~] автоматическое конструирование
construction ~ [kən'strʌkʃən ~] строительство
electrical ~ [ɪ'lektrɪkl ~] электротехника
electronic ~ [ɪlek'trɒnɪk ~] электроника
mechanical ~ [mɪ'kænɪkl ~] машиностроение
petroleum ~ [pə'treʊlɪəm ~] технология добычи нефти
software ~ ['sɒftweə ~] программирование
(attr) машиностроительный
entirely [ɪn'taɪəli] (adv) полностью
equal ['iːkwəl] (v) равняться
equip [ɪ'kwɪp] (v) (*with*) оборудовать, оснащать, вооружать, обеспечивать (*технически*)
equipment [ɪ'kwɪpmənt] (n) оборудование
air-conditioning ~ [ˌeəkən'dɪʃnɪŋ ~] установка для кондиционирования воздуха
drilling ~ ['drɪlɪŋ ~] буровое оборудование
excavating ~ [ˌɛkskəveɪtɪŋ ~] землеройное оборудование
hauling ~ ['hɔːlɪŋ ~] доставочное оборудование
industrial-processing ~ [ɪn,dʌstriəl'prɒsɜːsɪŋ ~] оборудование для промышленной переработки
operating ~ [ˌɒpəreɪtɪŋ ~] рабочее оборудование
refrigeration ~ [rɪ'frɪdʒə'reɪʃn ~] холодильное оборудование
erect [ɪ'rekt] (v) возводить
essentially [ɪ'senʃəli] (adv) существенно
evident [ɪ'eɪdənt] (a) очевидный
excavate [ˌɛkskəveɪt] (v) рыть; копать; проводить земляные работы
excavation [ˌɛkskə'veɪʃn] (n) земляные работы, выемка грунта
excavator [ˌɛkskəveɪt ə] (n) экскаватор
bucket ~ ['bʌkɪt ~] ковшовый экскаватор
continuous bucket ~ [kən'tɪnjuəs 'bʌkɪt ~] многоковшовый экскаватор;
standard land ~ ['stændəd 'lænd ~] обычный сухопутный экскаватор
expand [ɪk'spænd] (v) расширять(ся)

experiment [ɪk'sperɪmənt] (n) эксперимент; (v) (*with*) экспериментировать (с)
explore [ɪk'splɔ:] (v) исследовать
export ['eksɜ:t] (n) экспорт, экспортирование; [ɪk'spɔ:t] (v) экспортировать
eye [aɪ] (n) проушина

Ff

facilitate [fə'sɪlɪteɪt] (v) облегчать; содействовать; помогать
facilities [fə'sɪlɪtɪz] (n) (pl) средства; оборудование
feeding ['fi:dɪŋ] (n) 1) подача; 2) загрузка
field [fi:ld] (n) область;
 magnetic ~ [mæɡ'netɪk ~] магнитное поле
fine [faɪn] (a) мелкий
fine-grading [,faɪn'ɡreɪdɪŋ] (n) планировка (*грунта*)
fit [fɪt] (v) (*with*) снабжать
fluid ['flu:ɪd] (n) флюид (*вещество, способное течь, фильтроваться через пористую среду; флюидами могут быть и жидкости и газы*), текучая среда; (a) жидкий
force [fɔ:s] (n) сила
fork [fɔ:k] (n) 1) вилка, вильчатый захват; 2) вильчатый подъёмник, погрузчик с вильчатым захватом
form [fɔ:m] (n) форма; (v) формировать, образовывать
former ['fɔ:mə] (a) **the** ~ первый (*из двух названных*)
foundation [faʊn'deɪʃn] (n) фундамент
forwards ['fɔ:wədz] (adv) вперёд
frame [freɪm] (n) рама, каркас
 rotating ~ [rəʊ'teɪtɪŋ ~] поворотная платформа
free-flowing [,fri:'fləʊɪŋ] (a) свободно текущий; сыпучий
freighter ['freɪtə] (n) транспортное средство, служащее для перевозок грузов (*грузовой самолёт, грузовой корабль*)
friction ['frɪkʃn] (n) трение
fright [fret] (n) груз
fuel ['fju:əl] (n) топливо

fulcrum ['fʊlkrəm; 'fl-] (n) (pl. **fulcrums, fulcra** [-rə]) точка опоры
function ['fʌŋkʃn] (v) функционировать

Gg

gasoline ['gæsəli:n] (n) (AmE) бензин
gear [gɪə] (n) 1. устройство; механизм; установка
 running ~ ['rʌŋɪŋ ~] 1) ходовая часть; 2) передача
 spur ~ ['spɜ: ~] цилиндрическое прямозубное колесо
 worm ~ ['wɜ:m ~] червячная шестерня; червячная передача
 ~ **reduction unit** [~ rɪ'dʌkʃn 'ju:nɪt] редуктор с зубчатой передачей
generation [ˌdʒenə'reɪʃn] (n) производство, создание
generator [dʒenə'reɪtə] (n) генератор
 electric ~ [ɪ'lektrɪk ~] электрогенератор
girder ['gɜ:də] (n) балка
governor ['gʌvənə] (n) ограничитель скорости
grab [græb] (n) 1) экскаватор; 2) ковш, черпак, захватное устройство
grade [greɪd] (v) профилировать (*грунт*)
grader ['greɪdə] (n) грейдер
gradually ['grædʒʊli] (adv) постепенно
grapple [græpl] (n) захват (*грейфер с тремя и более челюстями*)
gravel ['grævl] (n) гравий
gravity ['grævɪtɪ] (n) сила тяжести
grip [grɪp] (v) зажимать; захватывать
grooved [gru:vɪd] (a) желобчатый, рифлёный
grout [graʊt] (v) цементировать грунт
guide [gaɪd] (v) направлять; (a) направляющий
 ~ **rail** [~'reɪl] (n) направляющая
guy wire ['gaɪ 'waɪə] ванта

Hh

hammer ['hæmə] (n) молот
 pile ~ ['paɪl ~] свайный молот
 vibratory ~ ['vaɪbrətəri; vaɪ'breɪtəri ~] вибромолот
 hydraulic ~ [haɪ'drɔ:lɪk ~] гидравлический молот

hand [hænd] (attr) с ручным управлением
hand-held [ˌhændˈheld] (a) переносной, переносной
handle [ˈhændl] (n) рукоять; (v) 1) перемещать, транспортировать; 2) управлять
 crank ~ [ˈkræŋk ~] коленчатая рукоять
handling [ˈhændlɪŋ] (n) 1) управление, обращение; 2) погрузочно-разгрузочные работы; 3) перемещение грузов, транспортировка
hand-propelled [ˌhændprəˈpeld] (a) с ручным приводом
hang [hæŋ] (v) (*hung, hung* [hʌŋ]) висеть; (*from*) свисать
hardened [ˈhɑ:dnd] (a) закалённый
haul [hɔ:l] (v) (*from, to*) тянуть; везти, перевозить, подвозить, доставлять, транспортировать
hauling unit [ˈhɔ:lɪŋ ˈju:nɪt] транспортное средство
heavy [ˈhevi] (a) 1) тяжёлый; 2) крупный, большой
heavy-duty [ˌheviˈdju:ti] (a) сверхмощный
highly [ˈhaɪli] (adv) чрезвычайно
high-speed [ˌhaɪˈspi:d] (a) высокоскоростной; высокооборотный (*двигатель*)
highway [ˈhaɪweɪ] (n) автомобильная дорога (магистраль)
hinged [hɪndʒd] (a) откидной, поворотный, на петлях; шарнирный; створчатый
hoe [həʊ] (n) см. **Backhoe**
hoist [hɔɪst] (n) подъёмник; лебёдка; блок; тали
 air ~ [ˈeə ~] пневматический подъёмник
 cable ~ [ˈkeɪbl ~] лебёдка
 chain ~ [ˈtʃeɪn ~] цепной подъёмник
 differential ~ [ˌdɪfəˈrenʃəl ~] дифференциальные тали
 electric ~ [ɪˈlektrɪk ~] электрический подъёмник; электрический тельфер
 hand ~ [ˈhænd ~] ручная таль
 lever ~ [ˈli:və ~] рычажная таль
 pneumatic ~ [nju:ˈmæɪtɪk ~] пневматический подъёмник
 spur geared ~ [ˌspɜ: ˈgɪəd ~] цилиндрическая лебёдка
 worm geared ~ [ˌwɜ:m ˈgɪəd ~] червячная лебёдка
(v) поднимать(ся)
hoistway [ˈhɔɪstweɪ] (n) шахта лифта

hoisting ['hɔɪstɪŋ] (a) подъёмный, грузоподъёмный
~ **tackle** [ˈtækəl] (n) грузовой полиспаст
hole [həʊl] (n) яма, отверстие
hole-digger [ˌhəʊlˈdɪɡə] (n) ямокопатель
hook [hʊk] (n) грузоподъёмный крюк
 swivel ~ [ˈswɪvəl ~] поворотный крюк
hose [həʊz] (n) шланг
hydraulic [haɪˈdrɔːlɪk] (a) гидравлический
hydraulically [haɪˈdrɔːlɪkli] (adv) с помощью гидравлического привода

Ii

impact ['ɪmpækt] (n) толчок, импульс
impart [ɪmˈpɑːt] (v) (*to*) передавать (на)
import ['ɪmpɔːt] (n) импорт, импортирование; [ɪmˈpɔːt] (v) импортировать
improve [ɪmˈpruːv] (v) улучшать
in contrast [ɪnˈkɒntrəst] (*to*) в отличие от
inch [ɪntʃ] (n) дюйм (*равен 2,54 см*)
inclined plane [ɪnˈklaɪndˈpleɪn] наклонная плоскость
increase ['ɪŋkriːs] (n) рост, увеличения; [ɪnˈkriːs] (v) увеличивать(ся), расти
industrial [ɪnˈdʌstriəl] (a) промышленный, индустриальный
industrialization [ɪnˌdʌstriələɪˈzeɪʃn] (n) индустриализация, развитие промышленности
industrialize [ɪnˈdʌstriəlaɪz] (v) развивать промышленность, индустриализировать
industrialized [ɪnˈdʌstriəlaɪzd] (p) промышленно развитый
industry ['ɪndʌstri] (n) 1) промышленность; 2) отрасль промышленности; 3) фирма, предприятие
install [ɪnˈstɔːl] (v) устанавливать
instead of [ɪnˈsted əv] (prep) вместо
intermediate [ˌɪntəˈmiːdiət] (a) промежуточный
intermittent [ˌɪntəˈmɪtənt] (a) прерывистый, скачкообразный
into place [ɪntəˈpleɪs] в проектное положение
involve [ɪnˈvɒlv] (v) 1) вызывать; 2) включать в себя

Jj

jacking ring ['dʒækɪŋ 'rɪŋ] опорное кольцо
jackscrew ['dʒækskru:] (n) винтовой домкрат
jib [dʒɪb] (n) стрела (*крана, экскаватора*), укосина (*крана*)

Ll

landing ['lændɪŋ] (n) посадочная площадка
latter (a) ['lætə] **the** ~ последний (*из двух названных*)
leaf [li:f] (n) (pl. **leaves** [li:vz]) челюсть (*захватного устройства*)
leg [leg] (n) нога; лапа; опора
level ['levl] (n) уровень; (a) ровный
lever ['li:və] (n) рычаг; плечо рычага
 first-class ~ ['fɜ:st ,klɑ:s ~] рычаг первого рода
 hand ~ ['hænd ~] рычаг управления
 second-class ~ ['sekənd ,klɑ:s ~] рычаг второго рода
 third-class ~ ['θɜ:d ,klɑ:s ~] рычаг третьего рода
lift [lɪft] (n) подъёмник, лифт; (v) поднимать
light-duty [,laɪt 'dʒʊti] (a) маломощный
limit ['lɪmɪt] (v) (*to*) ограничивать
linear ['li:nɪə] (a) линейный
liquid ['lɪkwɪd] (n) жидкость;
 conducting ~ [kən'dʌktɪŋ ~] проводящая жидкость; (a) жидкий
load [ləʊd] (n) 1) груз; 2) нагрузка; (v) грузить, нагружать
loader ['ləʊdə] (n) погрузчик
 bucket ~ ['bʌkɪt ~] ковшовый погрузчик
loading ['ləʊdɪŋ] (n) нагружение, погрузка
lock [lɒk] (n) 1) замок, затвор, запор; 2) фиксатор, стопор
loop [lu:p] (v) огибать
lumber ['lʌmbə] (n) пиломатериал, строительный лес

Mm

machine [mə'ʃi:n] (n) машина
 bore tunneling ~ [,bɔ: 'tʌnlɪŋ ~] установка горизонтального направленного бурения

bulk-handling ~ [ˌbʌlk'hændlɪŋ ~] (строительная) машина для перемещения сыпучих или штучных материалов
cable-laying ~ [ˌkeɪbl'eɪɪŋ ~] кабелеукладчик
driving ~ ['draɪvɪŋ ~] силовая установка
earth-moving ~ [ˌz:θ'mu:vɪŋ ~] машина для земляных работ
elevating ~ ['elɪveɪtɪŋ ~] подъёмная машина
excavating ~ ['ɛkskəveɪtɪŋ ~] землеройная машина
materials-handling ~ [mə'tɪriəls'hændlɪŋ ~] подъёмно-транспортная машина
road-making ~ [ˌrəʊd'meɪkɪŋ ~] дорожная машина
tiering ~ ['tɪərɪŋ ~] подъёмно-транспортная машина для обслуживания многоярусных складов; штабелеукладчик
 2) станок; 3) механизм
simple ~ ['sɪmpl ~] простейший механизм
machinery [mə'ʃɪnəri] (n) машины; оборудование; механизмы
fluid ~ ['flu:ɪd ~] пневмооборудование
pumping ~ ['plʌmpɪŋ ~] насосное оборудование
machine-tool [mə'ʃi:n'tu:l] (n) станок
magnet ['mæɡnɪt] (n) магнит
permanent ~ ['pɜ:mənənt ~] постоянный магнит
maintenance ['meɪntənəns] (n) содержание, текущий ремонт
make [meɪk] (v) **made up** ['meɪd ʌp] (of) состоящий (из)
mallet ['mæɪlɪt] (n) деревянный молоток, киянка
maneuver [mə'nʉ:və] (v) маневрировать
manufacture [ˌmænjʉ'fæktʃə] (n) производство, изготовление; (v) производить, изготавливать
manufacturer [ˌmænjʉ'fæktʃərə] (n) производитель
mast [mɑ:st] (n) мачта
material [mə'tɪriəl] (n) вещество, материал; (attr) вещественный, материальный
math [mæθ] (n) см. **Mathematics**
mathematics [ˌmæθə'mætɪks] (n) математика
advanced ~ [əd'vɑ:ns ~] высшая математика
means [mi:nz] (n) (pl. **means**) средство
mechanic [mi'kænik] (n) механик
mechanical [mi'kænikl] (a) 1) механический; 2) технический

mechanics [mi'kæniks] (n) механика
fluid ~ ['flu:ɪd ~] механика жидкостей и газов
mechanism ['mekənɪzəm] (n) механизм
mechanization [,mekənaɪ'zeɪʃn] (n) механизация
mechanize ['mekənaɪz] (v) механизировать
mechanized ['mekənaɪzd] (a) механизированный
member ['membə] (n) элемент
merchandise ['mɜ:tʃəndaɪz] (n) товары, предметы торговли
military, the ['mɪlɪtri] (n) вооружённые силы
modify ['mɒdɪfaɪ] (v) модифицировать
monorail ['mɒnəʊreɪl] (n) монорельс
motion ['məʊʃn] (n) движение, перемещение; ход
motor ['məʊtə] (n) мотор, электродвигатель
electric ~ ['ɪlektɪk ~] электрический мотор
hydraulic ~ [haɪ'drɔ:lɪk ~] гидравлический двигатель (гидромотор)
mount [maʊnt] (n) установка
truck ~ ['trʌk ~] установка, смонтированная на грузовом автомобиле
crawler ~ ['krɔ:lə ~] установка на гусеничном ходу
(v) (*on*) устанавливать, монтировать, собирать (на)
mounted ['maʊntɪd] (a) (*on*) навешиваемый (на)
multiwheeled [ˌmʌltɪ'wi:lɪd] (a) многоколёсный

Nn

neither ... nor ... ['naɪðə ... 'nɔ:] (conj) ни ..., ни...
nuclear ['nju:kliə] (a) ядерный

Oo

obtain [əb'teɪn] (v) получать
offset ['ɒfset] (v) (*offset, offset*) компенсировать
opening ['əʊpənɪŋ] (n) отверстие
open-topped [ˌəʊpən'tɒpt] (a) открытого типа
operate ['ɒpəreɪt] (v) 1) управлять (*механизмом, автомобилем*), работать на (*машине и т. д.*); 2) работать (*о машине и т. д.*)

operation [ˌɒrəˈreɪʃn] (n) 1) управление; 2) (pl.) работы
earth-moving ~ [ˌz:θ ˈmi:vɪŋ ~] земляные работы
dredging ~ [ˈdredʒɪŋ ~] дноуглубительные работы
operational [ˌɒrəˈreɪʃənl] (a) 1) операционный; 2) рабочий; 3) работающий
operator [ˈɒpəreɪtə] (n) оператор; машинист
elevator ~ [ˈelɪveɪtə ~] лифтёр
operatorless [ˈɒpəreɪtələs] (a) безоператорный, работающий без оператора
oscilate [ˈɒsɪleɪt] (v) 1) качать(ся); 2) колебаться
out of date [aʊt əv ˈdeɪt] устаревший
overhead [ˈəʊvəhed] (a) подвесной
overlap [ˌəʊvəˈlæp] (v) (*with*) пересекаться (с)
overspeed [ˌəʊvəˈspi:d] (v) превышать скорость

Рр

pass [pɑ:s] (v) проходить
patent [ˈpætənt; ˈpeɪtənt] (n) патент; (v) патентовать
pave [peɪv] (v) мостить
pavement [ˈpeɪvmənt] (n) дорожное покрытие
pavement profiler [ˈpeɪvmənt ˈprəʊfaɪlə] дорожная фреза
paver [ˈpeɪvə] (n) дорожный укладчик
asphalt ~ [ˈæsfælt ~] асфальтоукладчик
concrete ~ [ˈkɒŋkri:t ~] бетоноукладчик
paving material [ˈpeɪvɪŋ məˈtɪriəl] дорожный материал
pawl [pɔ:l] (n) защёлка, собачка (*хранового механизма*), предохранитель
pendulum [ˈpendjʊləm] (n) маятник
perform [pəˈfɔ:m] (v) осуществлять
periphery [pəˈrɪfəri] (n) 1) периметр; 2) периферия, внешний контур, окружность; 3) обод
petrol [ˈpetrəl] (n) (BrE) бензин
physics [ˈfɪzɪks] (n) физика
pile-driver [ˈpaɪldrɑɪvə] (n) свайный копёр
pipe [paɪp] (n) труба;

sewer ~ ['sju:ə ~] канализационная труба
suction ~ ['sʌkʃn ~] грунтоприёмник (*землесосного снаряда*)
utility ~ [ju:'tɪlətɪ ~] труба инженерных коммуникаций
water ~ ['wɔ:tə ~] водопроводная труба

pipeline ['paɪpləɪn] (n) трубопровод

piston ['pɪstən] (n) поршень; плунжер

pit [pɪt] (n) приямок лифта

pit mining ['pɪt 'maɪnɪŋ] открытые горные работы

pivot ['pɪvət] (n) центр вращения; ось вращения, точка опоры; шарнир; (v) (*on/about*) вращаться (на/вокруг)

place [pleɪs] (v) укладывать

plank [plæŋk] (n) брус

plant [plɑ:nt] (n) завод, фабрика, предприятие

chemical ~ ['kemɪkl ~] химический завод

power ~ ['paʊə ~] 1) силовая установка; 2) электростанция

electric power ~ ['lektrɪk 'paʊə ~] 1) электросиловая установка;

2) электростанция

atomic energy power ~ [ə'tɒmɪk 'enədʒɪ 'paʊə ~] атомная электростанция

plate [pleɪt] (n) пластина

platen ['plætən] (n) пластина

plunger ['plʌndʒə] (n) плунжер; поршень; (attr) плунжерный

pocketed ['pɒkɪtɪd] (a) с пазами

polytechnical [ˌpɒli'teknɪkl] (a) политехнический

portable ['pɔ:təbl] (a) переносной

pound [paʊnd] (n) фунт (*равен 454 г*)

power ['paʊə] (n) сила; мощность; производительность

primary ~ ['praɪməɪ ~] основной источник питания

secondary ~ ['sekəndrɪ ~] вспомогательный источник питания

(v) приводить в действие, в движение

power takeoff ['paʊə teɪ'kɔf] 1) отбор мощности (от силовой установки); 2) механизм отбора мощности

press [pres] (v) нажимать

primary ['praɪməɪ] (a) основной

prime mover ['praɪm 'mu:və] буксир, тягач

principle ['prɪnsəpl] (n) 1) принцип; 2) правило, закон

process ['prəʊses] (n) процесс

manufacturing ~ [ˌmænjʊ'fæktʃəriŋ ~] промышленная технология

produce [prə'dju:s] (v) производить, изготавливать

producer [prə'dju:sə] (n) производитель; изготовитель

product ['prɒdʌkt] (n) продукт; продукция

production [prə'dʌkʃn] (n) производство, изготовление

productive [prə'dʌktɪv] (a) производительный; эффективный

productivity [ˌprɒdʌk'tɪvɪti] (n) продуктивность

profession [prə'feʃn] (n) профессия

project ['prɒdʒekt] (n) 1) проект; 2) строительный объект; [prə'dʒekt] (v) выступать

protect [prə'tekt] (v) (*through*) защищать (посредством, благодаря, с помощью)

protrusion [prə'tru:ʒn] (n) выступ

provide [prə'vaɪd] (v) обеспечивать

public utilities ['pʌblɪk ju:'tɪlɪtɪz] коммунальные сооружения

pull [pʊl] (n) натяжение

pulley ['pʊli] (n) блок (*вращается свободно и обеспечивает изменение направления движения ремня или каната*); шкив (*передает усилие с оси на ремень*); барабан (*конвейера*)

drive ~ ['draɪv ~] ведущий шкив; приводной барабан (*конвейера*)

single ~ ['sɪŋgl ~] простой блок

pulverize ['pʌlvəraɪz] (v) измельчать

pump [pʌmp] (n) насос

centrifugal ~ [ˌsentri'fju: gəl ~] центробежный насос

concrete ~ ['kɒŋkri:t ~] бетононасос

conduction ~ [kən'dʌkʃən ~] кондукционный насос

displacement ~ [dɪs'pleɪsmənt ~] поршневой насос

electromagnetic ~ [ɪˌlektɹəmæɡ'netɪk ~] электромагнитный насос

induction ~ [ɪn'dʌkʃən ~] индукционный насос

mechanical ~ [mi'kænikl ~] механический насос

reciprocating ~ [rɪ'sɪprəkeɪtɪŋ ~] поршневой насос

rotary ~ ['rəʊtəri ~] лопастный насос

(v) качать насосом

push [pʊʃ] (v) толкать

push-button [ˌpʊʃ 'bʌtən] (n) кнопка; (attr) кнопочный (*об управлении*)

Qq

quarry ['kwɔri] (n) карьер

Rr

ramp [ræmp] (n) рампа; пандус;

loading ~ ['ləʊdɪŋ ~] аппарат

range [reɪndʒ] (v) (*in*) классифицироваться (по)

rapid ['ræpɪd] (a) быстрый

ratchet ['rætʃɪt] (n) храповый механизм, храповик; трещотка

reach [ri:tʃ] (n) радиус действия; (v) (*to*) достигать

reactor [ri'æktə] (n) реактор

rear [riə] (n) задняя часть; (attr) задний; тыльный

reciprocate [ri'sɪprəkeɪt] (v) двигать(ся) назад и вперёд; иметь возвратно-поступательное движение

reciprocating [ri'sɪprəkeɪtɪŋ] (a) возвратно-поступательный

refinery [ri'faɪnəri] (n) нефтеперерабатывающий завод

replaceable [ri'pleɪsəbl] (a) заменяемый

reservoir ['rezəvɔː] (n) водохранилище

rest [rest] (v) покоиться

restrain [ri'streɪn] (v) удерживать

result [ri'zʌlt] (n) результат, итог, следствие

revolution [ˌrevə'ljuːʃn] (n) вращение

ride [raɪd] (v) (*rode, ridden* [rəʊd, rɪdn]) 1) идти, катиться, ехать; 2) двигаться; скользить

rigid ['rɪdʒɪd] (a) жёсткий

rip [rɪp] (v) разрезать

ripper ['rɪpə] (n) рыхлитель

robotics [rəʊ'bɒtɪks] (n) робототехника

rock [rɒk] (n) каменная порода

broken ~ ['brɔkn ~] щебень

roll [rɒl] (v) вращать(ся)

roller ['rɒlə] (n) 1) дорожный каток; 2) валец, ролик

sheep-foot ~ ['ʃi:pʊt ~] 1) кулачковый валец; 2) дорожный каток с кулачковым вальцом

rope [rəʊp] (n) канат, верёвка, трос
hoist ~ [hɔɪst ~] тяговый канат
rotary ['rəʊtəri] (a) вращательный
rotate [rəʊ'teɪt] (v) вращать(ся)
rotor circuit ['rəʊtə 'sɜ:kɪt] цепь ротора
rough-grading [ˌrʌf'greɪdɪŋ] (n) черновое профилирование (*грунта*)
row [rəʊ] (n) ряд
rubber ['rʌbə] (n) резина
ruggedness ['rʌɡɪdnɪs] (n) жёсткость, прочность (конструкции)
run [rʌn] (v) (*ran, run* [ræn, rʌn]) 1) бежать; 2) идти (*о дороге*); 3) управлять(ся)

Ss

safety ['seɪftɪ] (n) 1) безопасность; 2) лифтовой тормоз, ловитель
safety features ['seɪftɪ 'fi:tʃəz] меры обеспечения безопасности
science ['saɪəns] (n) наука
materials ~ [mə'tɪriəlz ~] материаловедение
sciences, the [saɪənsɪz] точные науки
environmental ~ [ɪn,vaɪəməntəl ~] науки об окружающей среде
scoop [sku:p] (n) ковш (*экскаватора*)
scrape [skreɪp] (v) скрести
scraper ['skreɪpə] (n) скрепер
elevating ~ ['elveɪtɪŋ ~] скрепер-элеватор (*скрепер с элеваторной загрузкой ковша*)
self-loading ~ [self'ləʊdɪŋ ~] самозагружающийся скрепер
screw [skru:] (n) винт
helical ~ ['helɪkl ~] винт
screw drive ['skru: 'draɪv] (n) червячно-реечная передача; передача винт-гайка
secondary ['sekəndrɪ] (a) вспомогательный
self-loading [ˌself'ləʊdɪŋ] (a) самозагружающийся
self-propelled [ˌselfprəpeld] (a) самоходный, самодвижущийся
sensor ['sensə] (n) датчик; сенсор
serve [sɜ:v] (v) служить
service ['sɜ:vɪs] (n) эксплуатация

shaft [ʃɑ:ft] (n) 1) шахта; 2) вал
~ **seal** [~ 'si:l] уплотнение вала

sheave [ʃi:v] (n) шкив, ролик с желобчатым ободом
drive ~ ['draiv ~] канатоведущий шкив
hoisting ~ ['hɔɪstɪŋ ~] канатоведущий шкив
tension ~ ['tenʃn ~] шкив натяжного устройства

sheet [ʃi:t] (n) 1) лист; 2) металлический (тонкий) лист, тонколистовая сталь

shoe [ʃu:] (n) башмак

shovel ['ʃʌvl] (n) одноковшовый экскаватор
power ~ ['paʊə ~] одноковшовый экскаватор с приводным двигателем

sideways ['saɪdweɪz] (adv) в сторону

simple ['sɪmpl] (a) простой

site [saɪt] (n) строительная площадка

sledge hammer ['sledʒ 'hæmə] (n) кувалда

slide [slaɪd] (v) (*slid, slid* [slɪd]) скользить; передвигать(ся)

sling [slɪŋ] (n) канат (*для подъёма груза*); строп

slope [sləʊp] (n) откос

slow-speed [sləʊ 'spi:d] (a) низкоскоростной; низкооборотный (двигатель)

smoothen ['smu:ðən] (v) выравнивать

solid ['sɒlɪd] (a) 1) твёрдый; 2) литой

source [sɔ:s] (n) источник

space station ['speɪs 'steɪʃn] космическая станция

span [spæn] (v) охватывать

sparking ['spɑ:kɪŋ] (n) искрение, искрообразование; (a) искрящий

specialist ['speʃəlɪst] (n) специалист

specialization [,speʃəlaɪ'zeɪʃn] (n) специализация

specialize ['speʃəlaɪz] (v) (*in*) специализироваться (в, на)

specialized ['speʃəlaɪzd] (a) специализированный

specialty ['speʃəltɪ] (n) (AmE) специальность

speciality [,speʃi'æltɪ] (n) (BrE) специальность

sprocket ['sprɒkɪt] (n) цепное колесо; звёздочка

stack [stæk] (v) штабелировать, укладывать в штабель

stacker ['stækə] (n) механический укладчик, штабелеукладчик, штабелёр
standard ['stændəd] (a) обычный, типовой, стандартный
standardized ['stændədaɪzd] (a) стандартизированный
stationary ['steɪʃənəri] (a) стационарный
steam [sti:m] (n) пар
steel [sti:l] (n) сталь
sticky ['stɪki] (a) липкий
stretch [stretʃ] (v) тянуть, растягивать
structural analysis ['strʌktʃərəl ən'æləsɪz] структурный анализ
subject ['sʌbdʒɪkt] (n) предмет; [səb'dʒekt] (v) подвергать
subjected [səb'dʒektɪd] (a) (*to*) подверженный
supply [sə'plaɪ] (v) снабжать, подводить (*ток*)
support [sə'pɔ:t] (n) опора; (v) поддерживать
supporting wall [sə'pɔ:tɪŋ 'wɔ:l] несущая стена
surface ['sɜ:fɪs] (v) (*with*) покрывать (поверхность) (чем-л.)
suspend [sə'spend] (*from*) (v) свисать (с)
swing [swɪŋ] (v) качать(ся), колебать(ся)
switch [swɪtʃ] (n) выключатель

Tt

tackle ['tækəl] (n) 1) принадлежности, инструмент, снаряжение; 2) полиспаут
tamping pad ['tæmpɪŋ 'pæd] трамбующий брус
teaching ['ti:tʃɪŋ] (n) преподавание
technical ['teknɪkəl] (a) технический
technician [tek'nɪʃn] (n) техник
technique [tek'ni:k] (n) техника, технические приёмы
technological [,teknə'lɒdʒɪkəl] (a) технологический
technologist [tek'nɒlədʒɪst] (n) технолог
technology [tek'nɒlədʒɪ] (n) технология
thermodynamics [θɜ:məʊdaɪ'næmɪks] (n) термодинамика
tilt [tɪlt] (v) наклонять, опрокидывать
tool [tu:l] (n) инструмент
tooth [tu: θ] (n) (pl. **teeth** [ti: θ]) зуб (мн. ч. зубья)

top-running ['tɒpɹʌnɪŋ] (n) передвижение (крана, грузовой тележки) с опорой на рельсы кранового пути; (a) передвигающийся с опорой на рельсы кранового пути

track [træk] (n) 1) путь, рельсовый путь; 2) трак, гусеница

crane ~ ['kreɪn ~] подкрановые пути;

tracked [trækt] (a) на гусеницах

trackage ['trækɪdʒ] (n) рельсовый путь

tractor ['træktə] (n) трактор; тягач

trailer ['treɪlə] (n) (автомобильный) прицеп

train [treɪn] (v) обучать(ся)

transfer [træns'fɜː] (v) передавать

transmission [trænz'mɪʃn] (n) 1) коробка передач; 2) передача, привод, трансмиссия

transport ['trænsɜːt] (n) перевозка, транспортировка; транспортное средство; [træn'sɜːt] (v) перевозить, транспортировать

travel ['trævl] (v) передвигаться, перемещаться

trench [trentʃ] (n) траншея, канава

trench-digger [ˌtrentʃ'dɪgə] (n) траншеекопатель

trencher ['trentʃə] (n) см. **Trench-digger**

trip [trɪp] (v) срабатывать

trolley ['trɒli] (n) грузовая тележка

trough [troʊ] (n) лоток

truck [trʌk] (n) 1) грузовой автомобиль

concrete-mixer ~ [ˌkɒŋkri:t'mɪksə ~] автобетоносмеситель

dumping ~ ['dʌmpɪŋ ~] грузовик-самосвал

fork-lift ~ ['fɔːklɪft ~] грузоподъемник; автопогрузчик

off-the-road ~ ['ɒfðə,rəʊd ~] внедорожный грузовик

over-the-road ~ ['əʊvəðə,rəʊd ~] грузовик для эксплуатации

на дорогах

2) ходовая часть;

end ~ ['end ~] ходовая тележка (крана)

turbine ['tɜːbaɪn, -ɪn] (n) турбина

turn [tɜːn] (v) вращать(ся)

type [taɪp] (n) тип

Uu

undercarriage ['ʌndəkæridʒ] (n) ходовая часть

underhung ['ʌndəhʌŋ; ʌndə'hʌŋ] (a) подвесной

uniform ['ju:nifɔ:m] (a) однородный

unit ['ju:nit] (n) 1) единица; 2) устройство, агрегат

combination excavating-hauling ~ [ˌkɒmbɪ'neɪʃn 'ɛkskəveɪtɪŋ 'hɔ:lɪŋ ~]
выемочно-погрузочная машина

power ~ ['paʊə ~] силовая установка

unpackaged [ʌn'pækɪdʒd] (a) бестарный; без упаковки

up to [ʌp tə] (prep) до

up-and-over [ˌʌpənd'əʊvə] (a) подъёмно-переворотный

upward ['ʌpwəd] (a) направленный вверх; (adv) вверх

user-friendly [ˌju:zə'frendli] (a) удобный для пользователя

Vv

valve [vælv] (n) клапан

vary ['veəri] (v) изменять(ся), менять(ся)

vehicle ['viəkl] (n) транспортное средство

vibrate [vaɪ'breɪt] (v) 1) вибрировать; 2) устанавливать с помощью вибромолота

vibrator [vaɪ'breɪtə] (n) вибрационный уплотнитель

virtually ['vɜ:tʃʊəli] (adv) практически

Ww

wagon ['wægən] (n) 1) грузовой вагон; 2) автофургон

wedge [wedʒ] (n) клин

well [wel] (n) колодец; (нефтяная) скважина

oil ~ ['ɔɪl ~] нефтяная скважина

wet [wet] (a) влажный

wheel [wi:l] (n) колесо, колёсико; зубчатое колесо, шестерня

electric ~ [ɪ'letrɪk ~] электромеханическая трансмиссия

worm ~ ['wɜ:m ~] червячное колесо

pocketed ~ ['pɒkətid ~] колесо с пазами

wheel and axle ['wi:l ənd 'æksl] колесо и ось
wheelbarrow ['wi:lbærəʊ] (n) тачка
wheeled [wi:ld] (a) колёсный
wheel-mounted [,wi:l'maʊntɪd] (a) на колёсном ходу
winch [wɪntʃ] (n) лебёдка
wind [waɪnd] (v) (*wound, wound* [waʊnd]) (*around*) вращаться (вокруг)
windlass ['wɪndləs] (n) ворот
work [wɜ:k] (n) работа; (v) работать; (*on*) работать (на) (*компанию, человека*)
wrap [ræp] (v) (*around*) оборачивать (вокруг)

Уу

yard [jɑ:d] (n) 1) ярд (*равен 91,44 см*); 2) склад открытого хранения;
 3) верфь

Abbreviations

A.D. ['eɪ'di:] (лат. Anno Domini) [ˌænəʊ 'dɒmɪnaɪ]	нашей эры
B.C. ['bi:'si:] – before Christ [bɪfɔ: 'kraɪst]	до нашей эры
cm – centimeter ['sentɪmi:tə]	сантиметр
etc. (лат. et cetera) [et'setərə]	и так далее;
	и прочее
ft – foot [fʊt] (pl. feet [fi:t])	фут (<i>равен 30,45 см</i>)
g – gram [græm]	грамм
i.e. ['ai'i:] (лат. id est) – that is	то есть
in – inch [ɪntʃ]	дюйм
kg – kilo ['kɪləʊ] (kilogram ['kɪləgræm])	килограмм
km – kilometer ['kɪlə,mi:tə; kɪ'lɒmɪtə]	километр
l – litre ['li:tə]	литр
lb. – pound [paʊnd]	фунт (<i>равен 454 г</i>)
m – meter ['mi:tə]	метр
m/s – metres per second ['mi:təz pɜ: 'sekənd]	метров в секунду
mm – millimeter ['mɪlɪmi:tə]	миллиметр

АННОТАЦИЯ (MAKING A SUMMARY)

Аннотация – это краткое содержание книги, статьи или любого другого текста. В ней в обобщенном виде раскрывается тематика публикации без полного раскрытия ее содержания. Аннотация даёт ответ на вопрос, о чём говорится в первичном источнике информации. Она включает в себя:

1. Вводную часть – библиографическое описание, тему (1–2 предложения);
2. Основную часть – перечень затронутых в публикации проблем (3–6 предложений);
3. Заключительную часть – краткую характеристику и оценку, а также кому адресуется данная публикация (1–2 предложения).

1	1
The text (article, story) is entitled “...”.	Текст (статья, рассказ) называется «...».
As the title implies the text (article, story) describes...	Согласно названию, в тексте (статье, рассказе) описывается...
The text (article, story) deals with ...	Текст (статья, рассказ) рассматривает...
The main idea of the text (article, story) is to show (to prove, to underline, to convince)...	Основная идея текста (статьи, рассказа) – показать (доказать, подчеркнуть, убедить)...
2	2
It gives a detailed analysis of...	Он даёт подробный анализ...
It is stressed that...	Подчёркивается...
It is spoken in detail about...	Подробно описывается...
It is reported that...	Сообщается, что...
It is shown that...	Показано, что...
... is proposed.	Предлагается...
... are examined.	Проверяются/рассматриваются...
... are discussed.	Обсуждаются...
Much attention is given to...	Много внимания уделено...

3	The following conclusions are drawn...	3	Делаются следующие выводы...
	The text (article, story) gives valuable information on...		Текст (статья, рассказ) даёт ценную информацию о...
	The text (article, story) is of great help to...		Этот текст (статья, рассказ) окажет большую помощь...
	The text (article, story) is of interest to...		Этот текст (статья, рассказ) представляет интерес для...

РЕФЕРИРОВАНИЕ (MAKING AN ABSTRACT)

В отличие от аннотации реферат не только даёт ответ на вопрос, о чём говорится в первичном печатном документе, но и о том, что говорится, т. е. какая основная информация содержится в реферируемом первоисточнике. Реферат даёт читателю относительно полное представление о затронутых в первоисточнике вопросах и, таким образом, освобождает пользователя от необходимости пересказа первоисточника.

Реферат включает в себя:

1. Вводную часть – библиографическое описание, тему.
2. Основную часть – основную идею; изложение содержания первоисточника.
3. Заключительную часть – выводы автора.

Завершить реферат можно кратким комментарием по теме.

Объём зависит от объёма первичного печатного документа и может составлять 10–15 % от объёма первоисточника.

1	TITLE I've read a text (article, story) entitled "...". I'd like to tell you about a text (article, story) entitled "...".	1	ЗАГЛАВИЕ Я прочитал(а) текст (статью, рассказа) под названием «...». Я бы хотел(а) рассказать о тексте (статье, рассказе) под названием «...».
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SOURCE

This is a text (article, story), published in the book (journal, magazine, newspaper) “...”.

AUTHOR

The author of this text (article, story) is ..., a famous scientist (writer, journalist).

SUBJECT

The text (article, story) deals with...

The text (article, story) describes...

The text (article, story) gives information about...

2

IDEA

The main idea of the text (article, story) is to show (to prove, to underline, to convince)...

CONTENT

The text (article, story) starts with the fact that...

The text (article, story) starts with description (characteristic) of...

Then the author describes...

After that the author touches upon the problem of...

Next the author deals with the fact (problem)...

Besides the author stresses that...

3

AUTHOR'S CONCLUSION

Finally the author comes to the conclusion that...

ИСТОЧНИК

Этот текст (статья, рассказ) опубликован в книге (научном журнале, журнале, газете) «...».

АВТОР

Автор этого текста (статьи, рассказа) – ..., известный учёный (писатель, журналист).

ТЕМА

Текст (статья, рассказ) рассматривает...

Текст (статья, рассказ) описывает...

Текст (статья, рассказ) даёт информацию о...

2

ИДЕЯ

Основная идея текста (статьи, рассказа) – показать (доказать, подчеркнуть, убедить)...

СОДЕРЖАНИЕ

Текст (статья, рассказ) начинается с факта о...

Текст (статья, рассказ) начинается с описания (характеристики)...

После автор описывает...

Затем автор затрагивает вопрос...

Потом автор рассматривает факт (вопрос)...

Кроме того, автор подчёркивает, что...

3

ВЫВОДЫ АВТОРА

В конце автор приходит к выводу...

YOUR ATTITUDE

My attitude to the text (article, story) is simple (complicated, contradictory).

I've learnt a lot of interesting (important, new) facts (information, things) from the text (article, story).

It makes us think of...

It proves the idea (theory, point of view, opinion)...

On the one hand I agree that...

On the other hand I can't agree that...

It can help us in self-education.

YOUR ADVICE

So in my opinion it is (not) worth reading.

ВАШЕ ОТНОШЕНИЕ

Моё отношение к тексту (статье, рассказу) однозначно (неоднозначно, противоречиво).

Я узнал(а) из текста (статьи, рассказа) много интересных (важных, новых) фактов (информации, вещей).

Он заставляет нас задуматься о...

Он подтверждает мысль (теорию, точку зрения, мнение)...

С одной стороны, я согласен (согласна), что...

С другой стороны, я не согласен (согласна), что...

Он может помочь в самообразовании.

ВАШ СОВЕТ

Таким образом, это (не) стоит читать.

СОЗДАНИЕ ПРЕЗЕНТАЦИИ (MAKING A PRESENTATION)

Составление плана презентации

Первый шаг в подготовке любого задания – записать всё то, о чём вы хотите сказать, и на основе этого составить план своего выступления, то есть определить, с чего лучше всего начать, а чем – закончить, что обязательно упомянуть, а что можно не затрагивать.

Вот несколько советов:

1. Запишите, что вашей аудитории нужно или интересно будет узнать по теме вашего выступления.

2. Может помочь составление списка вопросов, ответы на которые вы намерены дать. Эти ответы и лягут в основу выступления.

3. Располагайте части выступления в таком логическом порядке, который будет понятен аудитории. Ей будет легче следить за вашей мыслью. Не перескакивайте постоянно с одного на другое.

4. Приводите примеры. Они помогут понять вашу точку зрения.

Как начать презентацию?

Безусловно, публичное выступление заставляет нервничать, но если вы хорошо подготовлены, то будете чувствовать себе более уверенно. Для этого, приступая к работе над презентацией и публичным выступлением, следует сразу задать себе следующие вопросы. Прежде всего, это «С кем я собираюсь говорить?» и «Что они уже знают?». Во-вторых, «Где я выступаю?», «Какие там возможности для этого?». Вам придется брать в расчёт наличие аппаратуры и оборудования, например, экран, если хотите использовать PowerPoint. В-третьих, «Какова цель моей презентации?», то есть «Я хочу дать информацию, произвести впечатление, убедить или продать товар?» И последнее – «Сколько времени мне для этого надо?»

Ответы на эти вопросы оказывают огромное влияние на то, что вы включите в свою презентацию и как вы это сделаете. Некоторые для этого сначала записывают свои мысли, а затем пробуют расположить их по смысловым группам, таким образом, создавая основу своей речи. Короткие шпаргалки на небольших карточках, которые удобно держать в руке во время выступления, также помогают чувствовать себя уверенно. Если вы выступаете с электронной презентацией, вы должны подготовить слайды. Для этого надо собрать все изображения, диаграммы и т. п. и расположить их в нужном порядке. Как только вы почувствуете, что всё организовано правильно, можно начать готовить выступление.

Даже если аудитория знакома с вами, рекомендуется представиться и назвать свою должность. Затем объяснить, о чём вы планируете говорить и в какой последовательности. Упомяните, какой тип будете презентации вы использовать – например, электронную или в виде постера. Следует уточнить, когда слушатели могут задать интересующие вопросы – во время выступления или в конце. На первом слайде разместите основные пункты плана вашей речи. Также будет нелишним сообщить слушателям о том, что вы предо-

ставьте им раздаточный информационный материал; это поможет им слушать вас более внимательно.

USEFULL PHRASES FOR THE INTRODUCTION	ПОЛЕЗНЫЕ ФРАЗЫ ДЛЯ ВВЕДЕНИЯ
Good morning, afternoon, etc.	Доброе утро, день и т. п.
Hello. It's nice to see you (all).	Привет. Приятно (всех) вас видеть.
I'm ... from ... and it's a pleasure to be with you today	Я ..., и мне приятно сегодня быть с вами.
My name's ... and I'm a ...-year student of ... (name of the department).	Меня зовут ..., и я студент ... курса ... факультета.
I'm ... and I study at the ... course of ... (name of the department).	Я ..., и я учусь на ... курсе ... факультета.
I'd like to explain how ... works.	Я хотел бы объяснить, как работает...
I'd like to give you some information about...	Я хотел бы дать информацию о ...
I'm going to talk about/tell about...	Я собираюсь поговорить/рассказать о ...
The purpose of my talk is...	Цель моего выступления – ...
First of all, we'll look at ..., and then Finally, ...	Прежде всего, мы рассмотрим ..., затем В конце, ...
If you want to ask me any questions, please interrupt.	Если хотите задать вопрос, не стесняйтесь перебивать.
I'll explain first of all and then you can ask me any questions at the end.	Сначала я всё разьясню, а затем в конце вы сможете задать вопросы.
I want to turn now to...	Я хочу перейти к...

Как использовать наглядный материал (графики, диаграммы и т. п.)?

USEFULL PHRASES FOR REFERRING TO VISUAL AIDS	ПОЛЕЗНЫЕ ФРАЗЫ ДЛЯ ИСПОЛЬЗОВАНИЯ ДИАГРАММ И ГРАФИКОВ
I'd like to show you a chart/graph which represents...	Я бы хотел показать вам диаграмму/график, которая отражает...
This chart/graph represents...	Эта диаграмма/график отражает...
If we take a look we can see...	Если мы взглянем, мы увидим ...
I'd like to draw your attention to...	Я бы хотел привлечь ваше внимание к...
Take a look at...	Взгляните на...
Let's look now at...	Давайте посмотрим на...
As you can see, ...	Как вы видите, ...
You will see...	Вы увидите...
You will notice...	Вы заметите...
You can see that...	Вы видите, что...

Убеждение

Вот несколько советов, чтобы ваша презентация была убедительной:

1. Хорошо подготовьтесь. У вас должны быть все необходимые факты и данные, и они должны быть точными.
2. Дайте достаточно сведений справочного характера, но не перегружайте ими аудиторию.
3. Будьте готовы подкрепить каждое своё заявление доказательствами.
4. Очень полезным будет подготовить для аудитории распечатки с детальной технической или финансовой информацией. Слушатели смогут знакомиться с данными в привычном для себя темпе и обращаться к ним по мере необходимости.
5. Вы должны говорить с энтузиазмом. Улыбайтесь и не забывайте про зрительный контакт со слушателями.
6. Не бойтесь тишины.

7. Не торопитесь! Не спешите и говорите внятно.
8. Будьте готовы к вопросам!

Заключительная часть презентации

В заключении следует:

1. Ещё раз напомнить аудитории основные положения вашего выступления.
2. Подвести итоги.
3. Поблагодарить слушателей.
4. Предложить задавать вопросы.

USEFULL PHRASES FOR ENDING YOUR PRESENTATION	ПОЛЕЗНЫЕ ФРАЗЫ ДЛЯ ЗАКЛЮЧЕНИЯ
We've looked at ..., ... and...	Мы рассмотрели ..., ... и ...
I've discussed ..., ... and...	Мы обсудили ..., ... и ...
It seems clear that...	Очевидно, что ...
It's my view that...	На мой взгляд, ...
Thank you for your attention.	Спасибо за внимание.
I'll be happy to answer any questions you may have.	Я буду счастлив ответить на любые ваши вопросы.

Создание постерной презентации

Постерная презентация, или постерный доклад, представляет собой подготовленное устное выступление по выбранной теме со зрительной опорой в виде плаката.

Составив с планом презентации, напишите короткий (!) текст под каждым пунктом плана. По возможности, используйте иллюстрации. Определитесь с компоновкой материала. Распечатайте плакат, прикрепите его на стену. После выступления будьте готовы ответить на вопросы.

Требования к оформлению постера:

1. Плакат должен быть формата А2 или А1 в горизонтальном или вертикальном расположении. Заглавие, информация об авторе должны располагаться сверху. Буквы заглавия должны быть не менее 2,5 см в высоту. Остальной текст должен легко читаться с расстояния в 1,5 м.

2. Сформулируйте заглавие так, чтобы оно отражало суть вашей презентации
3. Обязательно давайте пояснение графической информации.
4. Используйте на плакате цифры, буквы, стрелки, чтобы показать нужный порядок следования частей вашей презентации.
5. Нет необходимости заполнять каждый квадратный сантиметр. Оставляя пустое пространство, вы выделяете смысловые блоки.
6. Используйте цвета и графику, чтобы привлечь внимание

Оценивание презентации

Оценивание презентации представляет собой выставление баллов (минимум 1 балл, максимум 5 баллов) за выполнение требований, предъявляемых к презентации. К таким требованиям относятся:

1. Содержание:
 - Хорошо ли подготовился оратор?
 - Разбирается ли он в теме?
2. Организация:
 - Есть ли введение? Заключение?
 - Грамотно ли выстроена структура выступления?
3. Голос:
 - Выступал ли оратор убедительно и с воодушевлением?
 - Достаточно ли внятно говорил?
 - Сумел ли заинтересовать?
 - Произносил или читал своё выступление?
 - Была ли скорость речи нормальной для слушателей?
4. Манера выступления:
 - Был ли выступающий «зажат»?
 - Использовал ли подходящие жесты?
 - Был ли зрительный контакт с аудиторией?
 - Вовлекал ли её в беседу?
5. Наглядные пособия:
 - Использовались ли наглядные пособия?
 - Легко ли их было разглядеть?
 - Помогли ли они?

Полученные баллы затем суммируются и переводятся в отметку.

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