**КОМИТЕТ ОБРАЗОВАНИЯ, НАУКИ И МОЛОДЕЖНОЙ ПОЛИТИКИ ВОЛГОГРАДСКОЙ ОБЛАСТИ**

**государственное бюджетное профессиональное образовательное учреждение «Волгоградский строительный техникум» (ГБПОУ «Волгоградский строительный техникум»)**

УТВЕРЖДАЮ
Директор ГБПОУ
«Волгоградский
строительный техникум»
_____ Г.А. Голикова
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# Учебное пособие «Английский язык для строительных специальностей»

Рекомендовано УМО по среднему профессиональному образованию Волгоградской области к использованию в учебном процессе в качестве учебного пособия для учебных заведений СПО Волгоградской области

Волгоград, 2018

РАССМОТРЕНО
На заседании ЦМК ЕН
Председатель
_____ Е.В. Фролова
Протокол № 9
от «10» апреля 2018 г.

РАССМОТРЕНО
на заседании учебно-методического совета
ГБПОУ «Волгоградский строительный техникум»
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_____М.Н. Ломова

Учебное пособие «Английский язык для строительных специальностей» предназначено для студентов 3 курса, изучающих иностранный язык в сфере профессиональной коммуникации в рамках учебной программы. Пособие состоит из двух разделов: строительные материалы и строительная техника. Пособие включает аутентичный текстовый материал, что позволяет студентам не только формировать умения работать с первоисточниками, но и получить информацию, являющуюся актуальной в современном мире.

Авторы-составители:
Ломтева Людмила Владимировна, преподаватель первой квалификационной категории
Шуваева Юлия Владимировна, преподаватель

**Комитет образования, науки и молодежной политики**
**Волгоградской области**
**Совет РУМО профессиональных образовательных организаций**
**Волгоградской области**

400107 г. Волгоград, проспект маршала Г.К. Жукова, 83. Телефон 36-63-14

# РЕШЕНИЕ
# президиума Совета РУМО

*Учебное пособие Английский язык для строительных специальностей, ГБПОУ «Волгоградский строительный техникум», авторы-составители Ломтева Л.В., Шуваева Ю.В.,* ***соответствует*** *требованиям РУМО в системе СПО Волгоградской области в части комплексного учебно-методического обеспечения и* ***рекомендован*** *президиумом Совета РУМО в качестве учебного издания для использования в учебном процессе профессиональных образовательных организаций, реализующих программы среднего профессионального образования.*

**Председатель президиума**

**Совета РУМО, д.и.н. профессор** **В.П. Попов**

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## Пояснительная записка

Учебное пособие «Английский язык для строительных специальностей» предназначено для студентов 3 курса, изучающих иностранный язык в сфере профессиональной коммуникации в рамках учебной программы. Профессиональная направленность обучения требует интеграции иностранного языка с общепрофессиональными дисциплинами и профессиональными модулями специальностей «Строительство и эксплуатация зданий и сооружений» и «Архитектура». Материалы в данном пособии ориентированы на последние достижения в строительной сфере, отражают новшества, касающиеся профессиональных интересов обучающихся.

Цель данного пособия – помочь студентам овладеть специальной терминологией, научить переводить тексты по специальности и извлекать информацию, необходимую для профессионального общения. Пособие включает аутентичный текстовый материал, что позволяет студентам формировать умения работать с первоисточниками и получать информацию актуальную в современном мире.

Пособие состоит из двух разделов: строительные материалы (натуральные строительные материалы, искусственные строительные материалы, современные строительные материалы) и строительная техника. Каждый раздел включает в себя лексические упражнения, тексты по специальности и текстовые упражнения.

Работа с лексикой учит студентов использовать языковую догадку, логическое мышление, позволяющие переводить слова и выражения, не пользуясь двуязычным словарем. Слова, относящиеся к специальной лексике, даны с переводом и комментарием, а выделенные курсивом заучиваются студентами наизусть, так как составляют лексический минимум, необходимый для осуществления профессионального общения на изучаемом языке.

Профессиональные тексты подобраны согласно учебному плану и представляют собой аутентичный материал, позволяющий студентам познакомиться с новыми тенденциями, современными материалами и актуальными технологиями в строительстве. Работа с представленными текстами включает в себя их перевод, поисковое чтение, сопоставление и анализ полученной информации. Студенты не только учатся работать со специализированным текстовым материалом, но и узнают много нового и интересного, что расширяет их знания по специальности, умения общаться на профессиональные темы.

Текстовые упражнения необходимы для извлечения информации и более глубокого понимания содержания текста. Они включают в себя поиск эквивалентов в тексте, ответы на вопросы, обсуждение предложенной темы. Выполнение этих упражнений позволяет развивать умения грамотно

формулировать свою мысль в устной и письменной речи, отвечать на вопросы и выражать собственное мнение.

Иллюстрации позволяют студентам лучше понять содержание текста, опираясь на рисунки, а также делают процесс обучения более увлекательным.

Обучающиеся должны выполнить весь объем заданий. Пропущенные работы в аудитории студент обязан выполнить самостоятельно и устно отчитаться по ним.

В конце пособия приведены контрольные вопросы по изученным темам.

Таким образом, в процессе обучения у студентов формируются следующие общие компетенции:

ОК 01. Выбирать способы решения задач профессиональной деятельности применительно к различным контекстам;

ОК 02. Осуществлять поиск, анализ и интерпретацию информации, необходимой для выполнения задач профессиональной деятельности;

ОК 03. Планировать и реализовывать собственное профессиональное и личностное развитие;

ОК 04. Работать в коллективе и команде, эффективно взаимодействовать с коллегами, руководством, клиентами;

ОК 09. Использовать информационные технологии в профессиональной деятельности;

ОК 10. Пользоваться профессиональной документацией на государственном и иностранном языках;

Данное учебное пособие способствует формированию у студентов следующих умений:

- общаться (устно и письменно) на иностранном языке на профессиональные; - переводить (со словарем) иностранные тексты профессиональной направленности; - самостоятельно совершенствовать устную и письменную речь, пополнять словарный запас;

и знаний:

- лексического минимума, необходимого для чтения и перевода (со словарем) иностранных текстов профессиональной направленности;

- грамматического минимума, необходимого для чтения и перевода (со словарем) иностранных текстов профессиональной направленности.

Знания обучающихся проверяются с помощью вопросов по изученным темам, а умения в ходе выполнения практических заданий на протяжении всего учебного года.

Критерии оценки:

«Отлично» – грамотное, логичное изложение ответа.

«Хорошо» – грамотное изложение ответа, содержание имеет отдельные неточности.

«Удовлетворительно» – неполное, непоследовательное изложение ответа, содержание имеет неточности и грубые ошибки.

«Неудовлетворительно» – беспорядочное изложение ответа, искажающее смысл, неверный ответ на поставленный вопрос.

## *Unit I. BUILDING MATERIALS*

Цель: - выучить основные термины и понятия по разделу;
- осуществить перевод текстов, используя выученную лексику;
- подготовить ответы на контрольные вопросы.

Оборудование, материалы: двуязычные, политехнические и электронные словари.

## 1.1. BUILDING MATERIALS

- **Vocabulary**

1. Read the words and give their meaning.

| | | |
|---|---|---|
| material | metal | gypsum |
| crystalline | interior | natural |
| mechanical | column | facade |
| decoration | cement | to press |
| corrosion | block | granite |
| combination | modern | electric |
| aluminum | plastics | crane |
| inertness | chemical | physical |
| cellulose | protein | insulation |

2. Find English equivalents

| | |
|---|---|
| мрамор | rocks |
| природные камни | stone |
| железо | timber |
| камень | lime |
| известь | sand |
| смола | clay |
| бетон | concrete |
| песок | marble |
| чугун | brick |
| сталь | iron |
| глина | cast iron |
| кирпич | steel |
| древесина, лесоматериал | glass |
| стекло | resin |

3. Translate the following words and word combinations and learn them by heart

1) Sandstone; fire-resistance (resistance - сопротивление); ferroconcrete; pipeline (pipe - труба);

2) Bearing structure (to bear – нести нагрузку); mechanical strength (strength - прочность); sound and heat insulation (sound - звук, heat - тепло); electric and heat conductivity (conductivity - проводимость); corrosion resistance; long span roof (span - двускатный); dome roof (dome - купол); crane jib (jib - стрела); to face rough walls (rough - неоштукатуренный)

4. Learn the words in italics

*to divide* – разделять
*to bind* – связывать, скреплять
*mortar* – строительный раствор
*ferrous metals* – черный металл
*compactness* – плотность
*durable* – прочный, долговечный
to belong – принадлежать
to cut – резать
*to shape* – придавать форму
*property* – свойство
disadvantage – недостаток
unit – элемент, узел
*masonry* – каменная кладка
main – основной
*artificial* – искусственный
*framework* – каркас
derivative – производное
*alloy* – сплав
to refer – относиться
to use – использовать
purpose – цель
step – ступенька
*to decay* – гнить
*hard* – твердый
*porosity* – пористость
*to face* – облицовывать
to burn – гореть
to fasten – скреплять, соединять
to include – включать
to apply – применять
easy – легкий
cheap – дешевый
kind – вид, тип
*reinforcement* – арматура

- **Text**

1. Read the text and find the answers to the questions

1) What groups are all building materials divided into?
2) What building materials are mentioned in the text?

**Building Materials**

All building materials are divided into three main groups:

1) Main building materials such as rocks and artificial stones, timber and metals.

2) Binding materials such as lime, gypsum and cement.

3) Secondary or auxiliary materials which are used for the interior parts of the buildings.

We use main building materials for bearing structures, binding materials are used for making artificial stone and for joining together masonry units. For the interior finish of the building we use secondary materials.

Natural building materials are stone, sand, lime and timber. Cement, clay products and concrete are examples of artificial building materials.

Timber is referred to the group of the main building materials. It is the most ancient structural material. It is light, cheap and easy to work. But wood has certain disadvantages: it burns and decays.

Stone belongs to one of the oldest building materials used by man. It has many properties such as mechanical strength, porosity, compactness, sound and heat insulation and fire-resistance. The stones which are usually used for masonry work are granite, sandstone and marble. Granite is very hard, strong and durable. It is used for foundations, columns, steps and for entire facades. Its colour may be grey, yellow, pink or deep red. Sandstone is comparatively easy to cut and shape. It is often used for facing rough walls and for interior decorations. Marble is a crystalline stone chiefly used for decorative purposes. It takes on a high polish.

Bricks were known many thousands of years ago. They are the examples of artificial building materials. Brick is made by pressing clay into blocks and burning them to hardness. Bricks are hard and easily fastened together with the help of mortar. They are produced in a great variety for widely different purposes.

Metals are divided into ferrous and non-ferrous metals. Ferrous metals include iron, steel and its alloys. Cast iron is the cheapest of the ferrous metals. It is chiefly used in building for compressed members of construction. Steel is used for framework of buildings and as reinforcement in modern ferroconcrete structures. Non-ferrous metals have the following characteristics: high electric and heat conductivity, high corrosion resistance, light weight. The oldest and the best known light metal is aluminum. It is used in lift bridges, long span roofs, dome roofs, crane jibs and in other structures.

Glass and plastics are widely used nowadays in construction of different kinds of buildings. Glass has excellent combination of physical, chemical and mechanical properties. The outstanding property of glass is its chemical inertness. Glass is used for constructing doors, walls, roofs, pipelines etc. Plastics is the name for various derivatives of resin, cellulose and protein. Nowadays plastics can be applied to almost every branch of building.

2. Read the text once more and find the equivalents to the following Russian word combinations

Основные строительные материалы; вяжущие строительные материалы; второстепенные строительные материалы; внутренние части здания; несущие конструкции; изготовление искусственных камней; элементы каменной кладки; внутренняя отделка; примеры искусственных строительных материалов; старейший строительный материал; некоторые недостатки; механическая прочность; огнестойкость; сравнительно легко режется и обрабатывается; для облицовки неоштукатуренных стен; кристаллический камень; легко соединяются с помощью раствора; цветные металлы; самый дешевый черный металл; конструкции, работающие на сжатие; каркас здания; современные железобетонные конструкции; устойчивость против коррозии; подъемный мост; выдающиеся свойства стекла; производные смолы, целлюлозы и протеина.

3. Complete the following sentences.

1) All building materials are divided into three main groups: … . 2) They are also divided into two groups: … . 3) Natural building materials are … . 4) Cement, clay products and concrete are … . 5) Wood has certain disadvantages: … . 6) Stone has many properties such as … . 7) The stones which are usually used for masonry works are … . 8) Brick is made by … . 9) Metals are divided into two groups: … . 10) Ferrous metals include … . 11) Non-ferrous metals have the following characteristics: … . 12) Glass has excellent combination of … . 13) Plastics is the name of … .

4. Translate the following sentences using “be referred to” or “belong to”

1) Искусственные и естественные камни относятся к группе основных строительных материалов. 2) Металл также относится к этой группе. 3) Известь, гипс и цемент относятся к группе вяжущих материалов. 4) Кирпич относится к группе искусственных строительных материалов. 5) Песок относится к естественным строительным материалам. 6) Дерево и камень относятся к старейшим строительным материалам. 7) Сталь относится к черным металлам. 8) Стекло и пластмасса относятся к материалам, которые сейчас широко используются в строительстве.

5. Say whether the following statements are true or false.

1) We use main building materials for bearing structures.
2) Concrete and cement are natural building materials.
3) Timber is the newest structural material.
4) The stones which are usually used for masonry work are granite, sandstone and marble.

5) Granite is very hard, strong and durable.
6) Bricks are hard and easily fastened together with the help of mortar.
7) Cast iron is the cheapest of the ferrous metals.
8) Steel is referred to the group of non-ferrous metals.
9) Aluminum is the newest metal.
10) Nowadays we don't use glass and plastics in construction of buildings.

## 1.2. NATURAL BUILDING MATERIALS

**STONE**

- **Vocabulary**

1. Read the words and guess their meaning.

| | | |
|---|---|---|
| variety | to limit | public |
| unique | texture | to deposite |
| volcanic | metamorphic | external |
| abrasive | pressure | bluish |

2. Learn the following words

floor finish – напольное покрытие
to polish – полировать
abrasion resistant – устойчивый к истиранию
acid – кислота
smooth – гладкий
pathway – дорога
cobblestones - брусчатка
translucent – полупрозрачный
quarry – добывать
resistant to acids- устойчивый к воздействию кислот
to clad walls – облицовывать стены
layer – слой
smoothness - гладкость

- **Text**

1. Read and translate the text.

Stone is a great floor finish and is affordable in many countries; Italy and India are both known for the variety and quality of stone they produce. There is a great advantage to stone that is almost unique to floor finishes: you can polish it, and thus make it look and feel like new, at any time in its life.

**Granite** is a volcanic rock (it was originally lava that cooled to form solid rock) that has the following properties:

- It is very hard, strong, and abrasion resistant
- It is resistant to acids
- It can be polished to a mirror-like smoothness

These properties make it a great choice as a floor or countertop finish. It can also be used to clad walls. However it is available mainly in dark colours: black, red, grey. This darkness in colour does tend to limit its use in certain areas.

Its surface can also be worked to produce a variety of textures other than smooth. These rough finishes are mostly used outdoors, on pathways. The famous cobblestones of Europe are granite, for instance.

**Marble** is a metamorphic rock (meaning that it was made by the intense pressures and heat deep within the earth), and has the following properties:

- Most marbles are soft, and not very abrasion resistant
- They are not resistant to acids
- They can be polished to a mirror finish
- It is translucent - light can pass through it to the extent of a few millimeters

Thus, marbles should not be used in high-traffic areas such as the entryways or staircases of public buildings - granite would be much better in those cases. Since it is not acid resistant, you should not use marble under urinals (urine is acidic), and in kitchens, where lemon juice and other acids are present. But marble is prized for the beauty and richness of its finish; it also feels very special underfoot. It is available in a wide variety of colours, mainly light colours.

**Sandstone** is a sedimentary rock (rock formed by ancient rivers that slowly deposited material on their beds, that built up layer by layer over millions of years). It has the following properties:

- It is abrasion resistant, but not always strong, as it is formed in layers.
- It is usually highly resistant to acids
- It has a rough finish, and cannot be mirror-polished, as it consists of grains

These properties mean that it is good for decks and external areas because of its anti-slip properties. Since sandstone looks and feels very different from granite and marble, it has become fashionable to use these in boutique stores. Steve Jobs famously saw a bluish-grey sandstone on a trip to Florence, and many years later insisted that that very stone be used in all apple stores because of its 'integrity'. The stone is quarried, cut into tiles, and every piece graded individually for colour tone by master craftsmen. The tiles are then arranged so that pieces with similar colour are placed together, which makes them seem more uniform to the eye.

2. Fill in the table.

| Kind of stone | Origins | Properties | Usage |
|---|---|---|---|
| | | | |
| | | | |

## WOOD / TIMBER / LUMBER

- **Vocabulary**

1. Learn the following words:

versatile - универсальный
available – доступный
feasible – осуществимый, выполнимый

degradable – разлагаемый
renewable – возобновляемый

engineered wood – инженерная доска
residential construction – жилое здание

fiberboard - ДВП

expand – расширяться
collapse – разрушаться
tensile strength – сопротивление разрыву
bend – изгибаться
electrical current – электрический ток
plywood - фанера
oriented strand board (OSB) – ориентированно-стружечная плита

particle board - ДСП

- **Text**

1. Discuss the following:

1) What are the advantages of wood?
2) What are the disadvantages of wood?
3) Where can it be used?

2. Read and translate the text.

Wood has been used as a building material for thousands of years, being second only to stone in the world of construction. This exceptionally versatile material is commonly used to build houses, shelters and boats, but it is also extensively used in the furniture and home decor industry as well.

Perhaps one of the biggest advantages of using wood as a building material is that it is a natural resource, making it readily available and economically feasible. Wood can be fabricated into all kinds of shapes and sizes to fit practically any construction need. Wood is also the perfect example of an environmentally sustainable product; it is biodegradable and renewable, and no high-energy fossil fuels are required

to produce wood, unlike other common building materials such as brick, steel or plastic.

**Lumber or timber.** The words "lumber" and "timber" are often used interchangeably to refer to wood used in construction work, but there is the difference between terms. Pieces of wood that are smaller than 5 inches wide by 5 inches thick (regardless of length) are generally referred to as lumber. These pieces are machine-planed and sawn to fit certain dimensional specifications and are primarily used in residential construction. Pieces of wood over 5 inches wide by 5 inches thick (regardless of length) are referred to as timber. And any timber pieces that exceed 8" wide by 8" thick are referred to as beams. As timber pieces are larger in dimension, they are often used to construct the frames of large structures such as buildings and bridges. Timber is also commonly utilized in large quantities for railroad ties, mine shaft supports and crossbeams on utility poles.

Another type of wood commonly used in construction is known as engineered wood. Common examples of engineered wood include plywood, glued laminated timber (a.k.a. "glulam"), oriented strand board, fiberboard, and particle board. Engineered wood products are commonly used in a wide variety of residential, commercial and industrial construction projects.

**Types of wood.** Wood has traditionally been classified into two categories: hardwood and softwood. Generally speaking, hardwoods are considered to be heavier and denser than softwoods. Hardwoods are commonly used in the construction of walls, ceilings and floors, while softwoods are often used to make doors, furniture and window frames.

**Benefits of wood in construction.** Wood carries several benefits that make it an excellent candidate for use in a wide array of construction projects. One such benefit is its thermal properties, which give it an advantage in terms of its resistance to high temperatures. Unlike steel, which can expand or even collapse in high heat, wood actually dries out and becomes stronger as the heat increases. In addition, the heat conductivity of wood is relatively low in comparison to other materials such as aluminum, marble, steel, or glass.

Wood also contains remarkable acoustic properties. It can absorb sound and echoes, and is a favorite material of choice for the construction of structures where proper acoustics is important, such as concert halls. Wood is resistant to electrical current, making it an optimal material for electrical insulation. Another important characteristic of wood is its tensile strength, which is its ability to bend under pressure without breaking. Its remarkably strong qualities make it the perfect choice for beams. Wood is exceptionally light in proportion to its tensile strength, making it the preferred construction choice for surfaces that take a constant beating such as basketball courts and bowling lanes.

3. Answer the questions:

1) What is the difference between wood, timber and lumber?
2) Where is timber used?
3) Where is lumber used?
4) What are the examples of an «engineered wood»?
5) What types is wood classified into?
6) What are the benefits of wood usage in construction?

## 1.3. ARTIFICIAL BUILDING MATERIALS

### CONCRETE

● **Vocabulary**

1. Read the words and guess their meaning

| | | |
|---|---|---|
| monolithic | to produce | crystal |
| economical | to form | process |
| characteristic | gravel | universal |
| proportion | class | decade |
| foundation | type | product |
| cylindrical | gas | column |
| to granulate | arch | position |
| adequate | aviation | system |
| dam | | |

2. Find Russian equivalents

| | |
|---|---|
| important | огнестойкий |
| strong | долговечный |
| hard | важный |
| durable | искусственный |
| fire-resistant | мокрый, влажный |
| wet | строительный |
| structural | твердый |
| artificial | прочный |
| light | тяжелый |
| heavy | подходящий, годный, соответствующий |
| suitable | изготовленный заранее, сборный |
| prefabricated | кислотоупорный |
| acid-proof | легкий |

3. Learn the words and word combinations in italics:

| | |
|---|---|
| to imagine – представлять себе | *quality* – качество, свойство |
| grading – грануметрический состав | *aggregate* – заполнитель |
| to pour – лить, вливать | *to mix* – смешивать |

to hold – держать
to stick – липнуть
*to introduce* – вводить
*to compose* – состоять из
*to contain* – содержать
pavement – дорожное покрытие
to replace – заменять
innovation – нововведение
*structure* – здание, конструкция
compressive strength – прочность на сжатие
compressive stress – сжимающее напряжение
blast-furnace slag – доменный шлак
*amount* – количество
resistance – сопротивление
*beam* – балка
*setting* – схватывание
*void* – пустота
compound – соединение
*to foam* – пениться
sodium – натрий
potassium – калий
tensile strength – сопротивление разрыву
tensile stress – растягивающее напряжение

- **Text**

**1.** Read the text and translate it

## Concrete

It is difficult to imagine modern structure without concrete. Concrete is the very building material which led to great structural innovations. The most important quality of concrete is its property to be formed into large and strong monolithic units. The basic materials for making concrete are cement, aggregate and water.

Concrete is made by mixing cement, water, sand, and gravel in the right amount. As soon as it is thoroughly mixed it is poured into forms that hold it in place until it hardens. The crystals forming in the process of making concrete stick together in a very hard artificial stone.

The characteristics of concrete depend upon the quality of the materials used, grading of the aggregates, proportioning and amount of water. The most important requirements for concrete are: it should be hard, strong, durable, fire-resistant and economical.

Concrete can be divided into two classes: mass or plain concrete and reinforced concrete (ferro-concrete) where it is necessary to introduce steel.

Reinforced concrete is a combination of two of the strongest structural materials: concrete and steel. Concrete has an adequate compressive strength, but its tensile strength is low. On the other hand, steel has a high tensile strength. Suitable combination of these two materials provides resistance to both compressive and tensile stresses.

Plain concrete can be used for almost all building purposes. Reinforced concrete is used in building bridges, arches, dams, for structures under water, for foundations, columns, beams etc. The use of concrete and reinforced concrete is almost universal.

There is a broad division of concrete types into: 1) Dense concretes, which are composed of heavy aggregates and 2) Low-weight concretes, which are composed of light aggregates.

There are cellular concretes made by using materials which foam or form gas during the mixing of concrete. This gives very light weight to a product, because after setting it contains a large number of small voids.

Concrete can be made on a construction site and poured into position as a wet mix, or it may be used as the material for making prefabricated units in a factory. That is why there is another classification into in-situ and precast concrete.

Builders now produce two types of new building materials: alkali-slag and silica concrete. In alkali-slag concrete cement is replaced by a mixture of granulated blast-furnace slag and sodium and potassium compounds. This material is used for irrigation systems, roads, pavements and other structures. Silica concrete is light, fire-resistant and acid-proof. It contains no cement. Silica concrete is widely used in aviation and in under water constructions.

2. Read the text again and find the equivalents to the following Russian word combinations

Трудно представить; большие и прочные монолитные блоки; очень твердый искусственный камень; гранулометрический состав заполнителя; количество воды; самые важные требования; достаточная прочность на сжатие; высокая прочность на разрыв; сжимающие и растягивающие напряжения; тяжелый заполнитель; легкий заполнитель; большое количество маленьких пустот; строительная площадка; сборные элементы; два типа новых строительных материалов; измельченный доменный шлак; натрий-калиевые соединения; оросительные системы; подводные сооружения.

3. Learn the types of concrete

| | |
|---|---|
| plain concrete | неармированный бетон |
| reinforced concrete | железобетон |
| dense concrete | тяжелый бетон |
| light-weight concrete | легкий бетон |
| cellular concrete | ячеистый бетон |
| gas concrete | газобетон |
| foam concrete | пенобетон |
| in-situ concrete | монолитный бетон |
| precast concrete | сборный бетон |
| alkali-slag concrete | щелочной шлакобетон |
| prestressed concrete | предварительно-напряженный бетон |
| silica concrete | кремнеземистый/силикатный бетон |

- **Text**

**1.** Read and translate the text

## Types of Concrete

Plain concrete dates from very early days. It was employed by the Egyptians, the Romans and the Greeks in the construction of dams and bridges, roads and town walls. The Romans used it even in under-water structures some of which have survived till our time. As cement was not known in those times, concrete was made of clay and later of gypsum and lime.

Reinforced concrete is a combination of two of the strongest structural materials: concrete and steel. This term is applied to a construction in which steel bars or heavy steel mesh are properly embedded in concrete. The steel is put in position and concrete is poured around and over it. When the concrete hardens and sets, the resulting material gains great strength. Concrete has an adequate compressive strength, but its tensile strength is low. On the other hand, steel has a high tensile strength. Suitable combination of these two materials provides resistance to both compressive and tensile stresses. Reinforced concrete is used in building bridges, arches, dams, for structures under water, for foundations, columns, beams etc.

Prestressed concrete**.** There are two kinds of reinforced concrete: with ordinary reinforcement and with prestressed reinforcement. Prestressed concrete is not a new material. Its successful use has been developed rapidly during the last two decades.

In prestressed concrete steel is used as a means of producing a suitable compressive stress in the concrete. Prestressed concrete is not the subject to cracking. It enables lighter construction than ordinary reinforced work. Less steel is required than in ordinary reinforced concrete. Prestressed concrete is used for beams, columns, pipes, cylindrical water towers, etc.

Cellular concretes are made by using materials which foam or form gas during the mixing of concrete. This gives very light weight to a product, because after setting it contains a large number of small voids. It is sometimes called lightweight aerated concrete, variable density concrete, foamed concrete and lightweight or ultra-lightweight concrete. Applications of foamed concrete include: roof insulation, blocks and panels for walls, levelling floors, void filling, road sub-bases and maintenance, bridge abutments and repairs, ground stabilisation.

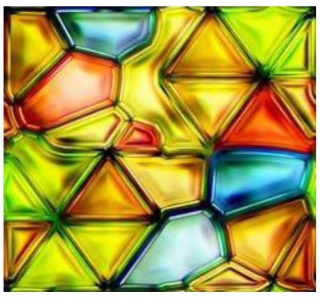
In alkali-slag concrete cement is replaced by a mixture of granulated blast-furnace slag and sodium and potassium compounds. This material is used for irrigation systems, roads, pavements and other structures.

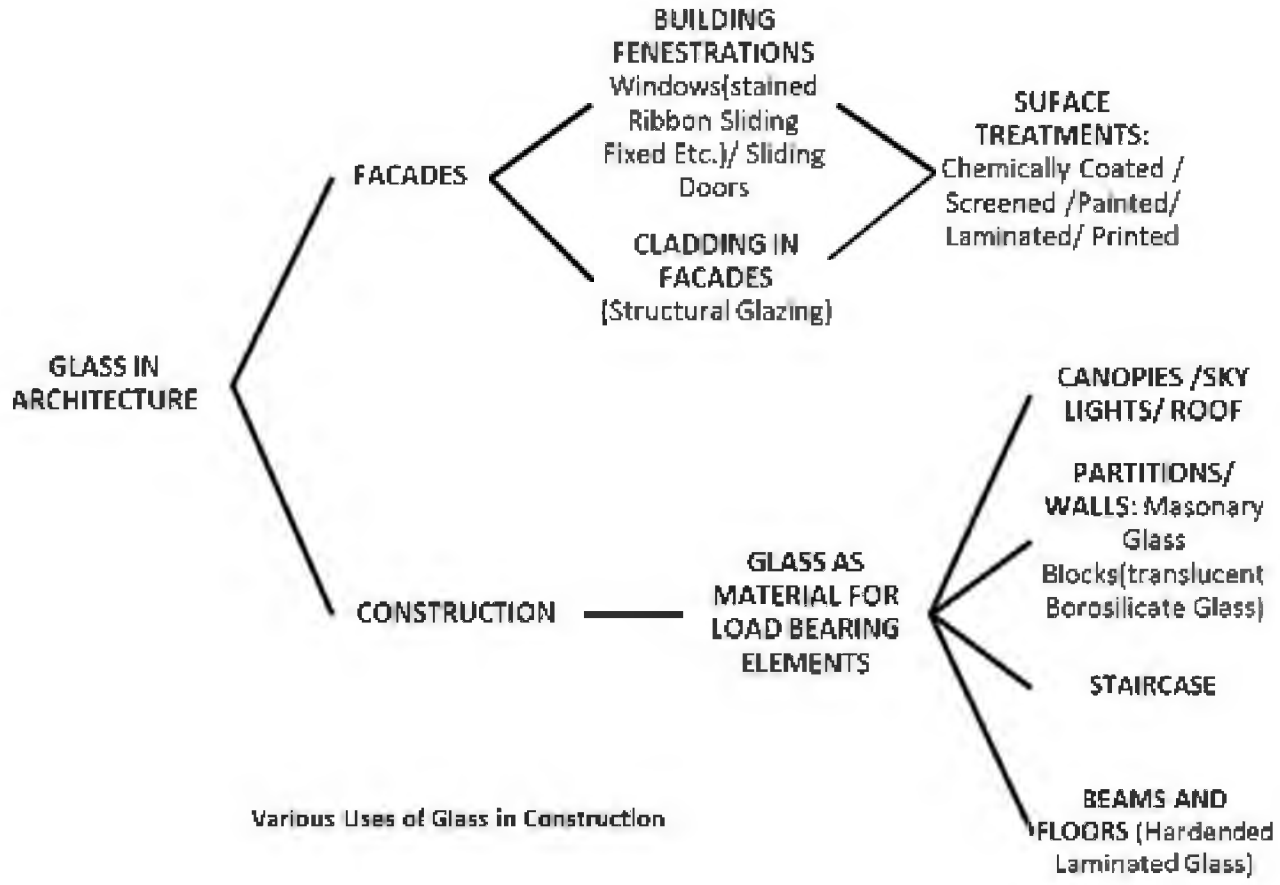
Silica concrete is light, fire-resistant and acid-proof. It contains no cement. Silica concrete is widely used in aviation and in under water constructions.

2. Fill in the table.

| Name | Fabrication | Ingredients | Usage |
|---|---|---|---|
| | | | |
| | | | |

## GLASS






Various Uses of Glass in Construction

- **Vocabulary**

*1.* Learn the words in italics:

| | | | |
|---|---|---|---|
| *float glass* – | полированное листовое стекло | dice-like pieces – | кусочки кубиками |
| *soda lime glass* – | силикатное стекло | *railing* – | перила |
| *clear glass* – | бесцветное стекло | *partition* – | перегородка |
| anneal – | обжигать | batch – | партия, серия |
| *molten glass* – | расплавленное стекло, стекломасса | *tinted glass* – | тонированное стекло |
| rupture – | разрушение, повреждение | *toughened glass*– | закаленное стекло |
| psi – | фунт-сила на кв. дюйм (единица измерения давления) | tempered – | смягченный, сдержанный |
| take a punch – | выдержать удар | distortion – | искажение |
| *transparency* – | прозрачность | *canopy* – | козырек |
| *transparent* – | прозрачный | *chromatic glass* – | цветное стекло |
| glare – | блеск, сияние, блик | *skylight* – | мансардное окно |
| *double-glazed units* – | стеклопакет | *shatterproof glass* – | безосколочное, небьющееся стекло |
| *hollow* – | пустотелый | *obscuration* – | затемнение |
| *foamed glass* – | пеностекло | moisture – | влага |
| *laminated glass* – | ламинированное стекло, триплекс | impermeability – | непроницаемость |

- **Text**

**1.** Read and translate the text

**Types of glass**

Float Glass. Float glass is also called soda lime glass or clear glass. This is produced by annealing the molten glass and is clear and flat. Its modulus of rupture is 5000-6000 psi. Stronger than Rocky Balboa taking punches from 2000 psi punches man Ivan Drago. It is available in standard thickness ranging from 2mm to 20mm. and has weight range in 6-26kg/m2. It has too much transparency and can cause glare. It is used in making canopies, shop fronts, glass blocks, railing partitions, etc.

Tinted Glass. Certain additions to the glass batch mix can add color to the clear glass without compromising its strength. Iron oxide is added to give glass a green tint; sulphur in different concentrations can make the glass yellow, red or black. Copper sulphate can turn it blue etc.

Toughened Glass. This type of glass is tempered, may have distortions and low visibility but it breaks into small dice-like pieces at modulus of rupture of 3600 psi. Hence it is used in making fire resistant doors etc. They are available in same weight and thickness range as float glass.

Laminated Glass. This type of glass is made by sandwiching glass panels within a protective layer. It is heavier than normal glass and may cause optical distortions as well. It is tough and protects from UV radiation (99%) and insulates sound by 50%. Used in glass facades, aquariums, bridges, staircases, floor slabs, etc.

Shatterproof glass. By adding a polyvinyl butyral layer, shatter proof glass is made. This type of glass does not from sharp edged pieces even when broken. Used in skylight, window, flooring, etc.

Extra clean glass. This type of glass is hydrophilic i.e. The water moves over them without leaving any marks and photocatylitic i.e. they are covered with Nanoparticles that attack and break dirt making it easier to clean and maintain.

Double Glazed Units. These are made by providing air gap between two glass panes in order to reduce the heat loss and gain. Normal glass can cause immense amount of heat gain and up to 30% of loss of heat of air conditioning energy. Green, energy efficient glass can reduce this impact.

Chromatic glass. This type of glass can control daylight and transparency effectively. These glass are available in three forms – photochromatic (light sensitive lamination on glass), thermochromatic (heat sensitive lamination on glass) and electrochromatic (light sensitive glass the transparency of which can be controlled by electricity switch.) It can be used in meeting rooms and ICUs.

Glass wool. Glass wool is a thermal insulation that consists of intertwined and flexible glass fibers, which causes it to "package" air, and consequently make good insulating materials. Glass wool can be used as filler or insulators in buildings, also for soundproofing.

Glass blocks. Hollow glass wall blocks are manufactured as two separate halves and, while the glass is still molten, the two pieces are pressed together and annealed. The resulting glass blocks will have a partial vacuum at the hollow center. Glass bricks provide visual obscuration while admitting light.

Foamed glass is a high porosity heat insulating material, available in blocks. It is made by heating a mixture of crushed or granulated glass and a blowing agent (chemical foaming agent) such as carbon or limestone. Near the melting point of the glass, the

blowing agent releases a gas, producing a foaming effect in the glass. After cooling the mixture hardens into a rigid material with gas-filled closed-cell pores. Foamed glass is non-flammable, has light weight, high mechanical strength, moisture, vapour and gas impermeability, thermal and acoustic insulating properties.

**2.** Fill in the table

| Name | Fabrication/Ingredients | Advantages/Properties | Usage |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

## 1.4. MODERN BUILDING MATERIALS

## PLASTICS

- **Vocabulary**

1. Read the words and give their meaning

| | | |
|---|---|---|
| synthetic | to characterize | epoxy resin |
| application | stress | adhesion |
| polymer | refrigerator | electrical |
| to synthesize | container | composite |
| organic | alcohol | heating |

2. Learn the following words

Thermoplastics – термопластик
Thermosetting plastics – термореактивные пластмассы, теплоустойчивые пластмассы
Viscoelastic – вязкоупругий, вязкоэластичный
Absorption – поглощение
Density – плотность
Toughness – жесткость (но эластичность, ex. алюминиевая ложка, способность материала поглощать энергию при воздействии)
Stiffness – жесткость (но хрупкость, ex. керамическая тарелка)
Alkali – щелочь
Adhesion – прилипание
Adhesive – клей
Casting – литье

- **Text**

1. Read and translate the text

One of new synthetic materials used widely is plastic. Plastics have found wide application both in everyday life and in industry.

Plastics are synthetic polymers. Most plastics are synthesized from organic chemicals or from natural gas or coal. Plastics are rapidly becoming important construction materials because of their great variety, strength, durability and lightness. Plastics can be classified into several broad types.

1) *Thermoplastics* soften on heating, and then harden again when cooled. They are flexible and easily stretched. Thermoplastics are also viscoelastic (they flow under stress). Typical examples of thermoplastics are polystyrene, polythene and PVC.

*Polystyrene* resins are characterized by high resistance to chemical and mechanical stresses at low temperatures and by very low absorption of water. These properties make the polystyrene especially suitable for radio-frequency insulation and for parts used at low temperatures in refrigerators and in airplanes.

*Polythene* is a white waxy solid with very low density, reasonable strength and toughness, but low stiffness. It is easily molded and has a wide range of uses in containers, pipes, coatings and insulation, and for soft-drinks bottles.

*PVC* is a colourless solid with outstanding resistance to water, alcohols and concentrated acids and alkalis. When compounded with plasticizers, it yields a flexible material more durable than rubber. It is widely used for cable and wire insulation, for production of tubes or pipes.

2) *Thermosetting plastics* (thermosets) do not soften when heated, and with strong heating they decompose. They have a higher density than thermoplastics. They are less flexible, more difficult to stretch, and are less subjected to creep.

Examples of thermosetting plastics include polyurethane and epoxy resins, most polyesters and phenolic polymers.

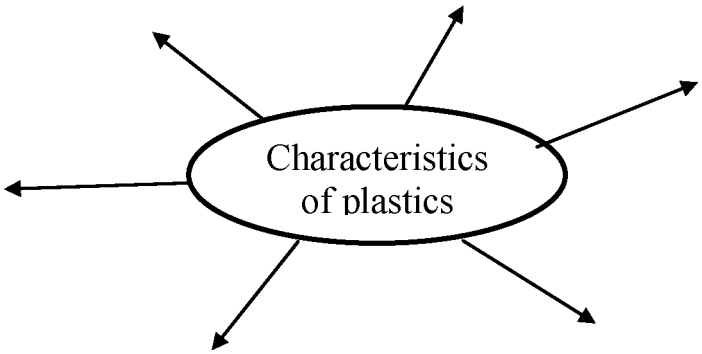
*Epoxy resins* have outstanding adhesion, toughness, and chemical resistance. They form strong bonds and have excellent electrical insulation properties. Large, complex, void-free castings can be made of them. They are also used as adhesives, and in composites for boat building and sport equipment.

The following characteristics of plastics are usually shared by all types: lightweight, corrosion resistance, electrical and thermal insulation, ease of fabrication, transparency, ease of coloring and economy of production. Using of plastics as materials for a construction in the form of sheets, rods or tubes is substituting the conventional metals. Plastics have now been developed to such an extent that they can be applied to almost every branch of building, from the laying of foundations to the final coat of paint.

2. Find English equivalents in the texts:

Органические химические вещества, размягчаться при нагревании, затвердевать при охлаждении, гибкий и легкорастяжимый, высокая устойчивость к химическому и механическому воздействию, бесцветный, электроизоляционные свойства, более высокая плотность, устойчивость к воздействию химических веществ, может применяться в любой отрасли строительства

3. Read the text again and complete the spidergram:




4. Answer the following questions:

1) What are the types of plastics?
2) What is the difference between thermoplastics and thermosetting plastics?
3) What are the features of the epoxy resin?
4) What is epoxy resin used for?
5) What is PVC used for?
**6)** What are the characteristics of polystyrene?

## NEW TYPES OF PLASTICS

- **Vocabulary**

1. Match the English words and word combinations with their Russian equivalents

| | |
|---|---|
| green house | теплопотеря |
| scratches | радиационная стойкость |
| glass-reinforced plastics | кровельный ламинат |
| heat loss | волоконно-оптический |
| roofing laminate | теплица, парник |
| energy radiation resistance | плавление |
| fiber-optic | стеклопластик |
| melting | царапины |

- **Text**

1. Discuss the following

1) Where are plastics used?
2) What are the characteristics of all types of plastics?
3) What forms can plastics as a construction material be used in?

2. Read and translate the text

Polycarbonate. This elastic is 300 times stronger than glass, is resistant to most chemicals, is twice as lighter than glass, has high abrasion and impact resistance. It can transmit as much light as glass without many distortions. Applications include window, green house glazing etc.

Acrylic. Acrylic is made of thermo plastics is weather resistant, is 5 times stronger than glass but is prone to scratches. It has excellent optics, is softer than glass but can accumulate a lot of dust. This is extensively used in to make playhouses, green house etc.

GRP panels. GRP is manufactured by combining hundreds of glass strands together using a pigmented thermosetting UV resin. Glass-reinforced plastics are also used to produce house building components such as roofing laminate, canopies etc. The material is light and easy to handle. It is used in the construction of composite housing and insulation to reduce heat loss.

ETFE. Ethylene tetrafluoroethylene is a plastic with high strength and corrosion resistance. ETFE has a relatively high melting temperature, excellent chemical, electrical and high-energy radiation resistance properties. It is strong, self cleaning and recyclable. It is prone to punctures by sharp edges and therefore mostly used for roofs. ETFE resins are resistant to ultraviolet light. But when burned, ETFE

releases hydrofluoric acid which is a highly corrosive liquid and a powerful contact poison. An example of its use is as pneumatic panels to cover the outside of the football stadium. Another key use of ETFE is for the covering of electrical and fiber-optic wiring used in high-stress, low-fume-toxicity and high-reliability situations.

3) Fill in the table

| **Type of plastics** | **Advantages** | **Disadvantages** | **Usage** |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

## STEEL IN FRAME STRUCTURES

- **Vocabulary**

1. Learn the following words

mild steel – низкоуглеродистая сталь
feature – свойство, черта
flexibility – гибкость
plasticity – пластичность
ductility – тягучесть
crack – трещина, трескаться
bend out of shape – деформироваться
lose strength – терять прочность
fire protection – огнезащита
high rise building – высотное здание
warehouse building – складское помещение
span spaces – пролетные строения
residential building – жилое здание
light gauge steel construction – лёгкие стальные конструкции из холодногнутых профилей
temporary structure – временное сооружение

- **Text**

1. Read and translate the text

Most construction is done with a type of steel called mild steel. Mild steel is a material that is immensely strong. Take a circular bar of steel 1 inch / 25mm in diameter. If you were to attach this bar securely to your ceiling, you could hang from it 20,000 Kg (which is 20 tons), or any one of the following: 18 Honda City Cars, 2 and a half African Elephants, 1 and a half London City Double-Decker Buses.

This immense strength is of great advantage to buildings. The other important feature of steel framing is its flexibility. It can bend without cracking, which is another great advantage, as a steel building can flex when it is pushed to one side by say, wind, or an earthquake. The third characteristic of steel is its plasticity or ductility. This means that when subjected to great force, it will not suddenly crack like glass, but slowly bend out of shape. This property allows steel buildings to bend out of shape, or deform, thus giving warning to inhabitants to escape. Failure in steel frames is not sudden - a steel structure rarely collapses. Steel in most cases performs far better in earthquake than most other materials because of these properties.

However one important property of steel is that it quickly loses its strength in a fire. At 500 degrees Celsius (930 degrees F), mild steel can lose almost half its strength. This is what happened at the collapse of the World Trade Towers in 2001. Therefore, steel in buildings must be protected from fire or high temperature; this is usually done by wrapping it with boards or spray-on material called fire protection.

Steel construction is most often used in:

- *High rise buildings* because of its strength, low weight, and speed of construction
- *Industrial buildings* because of its ability to create large span spaces at low cost
- *Warehouse buildings* for the same reason
- *Residential buildings* in a technique called light gauge steel construction
- *Temporary Structures* as these are quick to set up and remove.

2. Answer the questions:

1) What are the main properties of steel framing?
2) What does the flexibility of the frame mean?
3) What does its ductility mean for a building?
4) What is the disadvantage of steel frame structures?
5) Where is steel construction most often used in?
6) Why is it used in industrial buildings?
**7)** For what reason is it used in high rise buildings?

## NEW (MODERN) TYPES OF CONCRETE

- **Vocabulary**

1. Read the words and give their meaning

| | |
|---|---|
| texture | aesthetic |
| pigment | scale |
| stamp | decorative |
| compaction | friezes |
| vibration | record time |
| hardener | to move forward |

**2.** Learn the following words

| | |
|---|---|
| stamped concrete – штампованный бетон | fluidity – текучесть |
| to replicate – копировать | glass concrete – стеклобетон |
| wear resistance – износостойкость | rapid strength concrete – быстротвердеющий бетон |
| self-compacting concrete – самоуплотняющийся бетон | driveway aprons – подвижные подъездные пути |
| flowable – текучий | pier – опора |

- **Text**

1. Read and translate the text

Stamped concrete is an architectural concrete which has a superior surface finish. After a concrete floor has been laid, floor hardeners (can be pigmented) are impregnated on the surface and a mold which may be textured to replicate a stone / brick or even wood is stamped on to give an attractive textured surface finish. After sufficient hardening the surface is cleaned and generally sealed to give a protection. The wear resistance of stamped concrete is generally excellent and hence found in applications like parking lots, pavements, walkways etc.

Self-Compacting Concrete (SCC) is cohesive but flowable and took the shape of the formwork without use of any mechanical compaction. SCC is known as self-consolidating concrete in the United States. SCC is characterized by extreme fluidity, no need for vibrators to compact the concrete, placement being easier, no bleed water, or aggregate segregation.

Glass concrete. The use of recycled glass as aggregate in concrete has become popular in modern times, with large scale research being carried out at Columbia University in New York. This greatly enhances the aesthetic appeal of the concrete.

Recent research findings have shown that concrete made with recycled glass aggregates have shown better long-term strength and better thermal insulation due to its better thermal properties of the glass aggregates. GC without steel framing is commonly used for purely decorative applications such as decorative columns, exterior friezes, or limestone-like wall panels.

Rapid strength concrete. This type of concrete is able to develop high resistance within few hours after being manufactured. This feature has advantages such as removing the formwork early and to move forward in the building process at record time, repair road surfaces that become fully operational in just a few hours. It has wide structural application, full depth or repairs, in constructing highways, structural piers, bridge decks, balconies, parking garages, slabs, sidewalks, and patios, foundations and footings, driveway aprons.

**2.** Fill in the table

| Type of concrete | Properties | Usage |
|---|---|---|
| | | |
| | | |

## *Unit II. CONSTRUCTION EQUIPMENT*

Цель: - выучить основные термины и понятия по разделу;
- осуществить перевод текстов, используя выученную лексику;
- подготовить ответы на контрольные вопросы.

Оборудование, материалы: двуязычные, политехнические и электронные словари.

### 2.1. CONSTRUCTION EQUIPMENT

- Vocabulary

1. Read the words and give their meaning

| | |
|---|---|
| crane | bulldozer |
| variation | distance |
| project | scraper |
| grader | excavator |
| to drill | to transport |
| machine | operation |
| basic | comfort |
| specific | function |
| to classify | configuration |

2. Translate the following words and word combinations

loader (to load – грузить); wheel loader – (wheel – колесо); belt loader (belt – лента); dump truck (to dump – сваливать, truck – грузовик); rear dump truck (rear – задний); bottom dump truck (bottom – дно); side dump truck (side – сторона. бок); off-the-road dump trucks (road – дорога); front-end loader, concrete mixer (mix – смешивать)

3. Learn the words in italics

| | | | |
|---|---|---|---|
| *equipment* – | оборудование, техника | *hoist* – | подъемный механизм, лебедка |
| *excavation* – | котлован, земляные работы, выемка грунта | *conveyance* – | перемещение, транспортировка, перевозка |
| *to dig* - | рыть, копать | obstruction – | препятствие, преграда |
| to grout – | заливать раствор | *derrick* – | кран, стрела крана |
| *to compact* – | уплотнять | cableway – | подвесная дорога |
| *dozing* – | работа бульдозером | *compactor* – | каток |
| *grading* – | сортировка | *paver* – | асфальтоукладчик |
| *hauling* – | перевозка | *pile* – | свая |

| | | | |
|---|---|---|---|
| *power shovel* - | экскаватор одноковшовый | *pile driver* – | сваебойное оборудование |
| *backhoe* | экскаватор- | *demolition* | отбойный молоток |
| *loader* – | погрузчик | *hammer* – | |
| bucket – | ковш | blasting – | подрывные работы |

- **Text**

1. Read and translate the text:

**Classification of Construction Equipment**

There is a wide variety of relatively heavy machines which perform specific construction (or demolition) functions. It is customary to classify construction machines in accordance with their functions. There have been few changes for many years in the basic types of machines available for specific jobs, and few in the basic configurations of those that have long been available.

The basic operations involved in the construction of any project are *Excavation*, *Digging* of large quantities of earth, *Moving* them to fairly long distances, *Placement*, *Compacting*, *Leveling*, *Dozing*, *Grading*, *Hauling*, etc. Construction equipment can be classified as under:

1. Excavating Equipment is divided into two main classes: standard land excavators and marine dredges; each has many variations. The standard land excavator comprises machines that merely dig earth and rock and place it in separate hauling units, as well as those that pick up and transport the materials. Among the former are power shovels, draglines, backhoes, cranes with a variety of buckets, front-end loaders, excavating belt loaders, trenchers, and the continuous bucket excavator. The second group includes such machines as bulldozers, scrapers of various types, and sometimes the front-end loader.

2. Earthmoving Equipment (graders, bulldozers, wheel loader)

3. Hauling Equipment Excavated materials are moved great distances by a wide variety of conveyances. The most common of these are rear-dump trucks, which are classed as off-the-road trucks. Wagons towed by a rubber-tired prime mover are also used for hauling dirt. These commonly have bottom dumps which permit spreading dirt as the vehicle moves. In special cases side-dump trucks are also used. Conveyors, while not commonly used on construction jobs for hauling earth and rock great distances, have been used to good advantage on large jobs where obstructions make impractical the passage of trucks.

4. Hoisting Equipment is used to raise or lower materials from one elevation to another or to move them from one point to another over an obstruction. The main types

of hoisting equipment are derricks, cableways, cranes (tower cranes, mobile cranes, crawler mounted cranes), elevators, and conveyors, builders hoist, passenger hoist.

5. Compacting Equipment (compactor, paver)

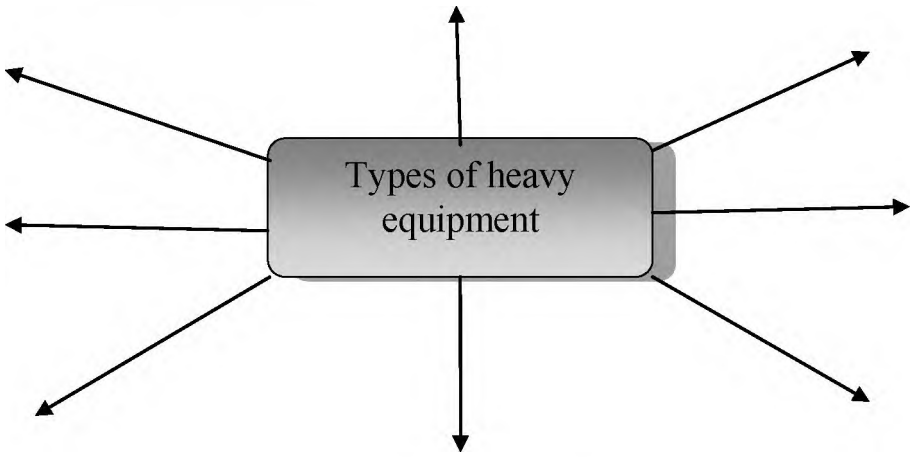
6. Pile Driving Equipment (pile driver)

7.Drilling Equipment is used to drill holes in rock for wells and for blasting, grouting, and exploring.

8.Equipment used for Concrete Works (concrete mixer, demolition hammer)

Design emphasis for new machines is on modifications that increase speed, efficiency, and accuracy; that improve operator comfort and safety; and that protect the public through sound attenuation and emission control.

2. Fill in the spidergram:




3. Agree or disagree with the statements given below. Mark the right sentences with "True", the wrong ones – with "False". Correct the wrong statements.

1) The standard land excavator comprises machines which raise or lower materials from one elevator to another.
2) Excavation equipment includes such materials as bulldozers, scrapers, the front-end loader.
3) Rear dump trucks are classified as off-the-road dump trucks.
4) It is customary to classify construction machines according to their configuration.
5) Conveyors can be used on large jobs where obstructions make impractical the passage of trucks.
6) Hauling equipment includes such machines as concrete mixer, demolition hammer.

4. Answer the following questions:

1) What machines does compacting equipment include?
2) What functions do heavy machines perform?

3) What machines does earth moving equipment include?
4) Can side-dump trucks be used for hauling jobs?
5) What are wagons for hauling dirt towed by?
**6)** Is excavation equipment divided into three main classes?

## 2.2. DUMP TRUCKS

- **Vocabulary**

1. Guess the words and give their meaning.

| | | | |
|---|---|---|---|
| configuration | to maximize | to go in reverse | tractor |
| trailer | maneuverability | to limit | cab |
| semi-trailer | to transport | massive | hydraulic |
| to roll off | gravel | to lift | site |

2. Learn the words in italics

| | | | |
|---|---|---|---|
| full truck chassis – | полноприводное шасси | nimble – | шустрый |
| *buckhead* – | перемычка | *loose material* – | сыпучий материал |
| *axle* – | ось | versatility – | подвижность |
| *payload capacity* – | грузоподъемность | clam shell type dump gate – | секторный затвор |
| wind row – | гряда насыпного материала | *ram* – | домкрат |
| to tilt – | наклоняться | *dump body* – | кузов |
| to impede – | мешать, препятствовать | to tip over – | переворачивать |

- **Text**

1. Read and translate the texts:

Dump trucks or production trucks are those that are used for transporting loose material such as sand, dirt, and gravel for construction. The typical dump truck is equipped with a hydraulically operated open box bed hinged at the rear, with the front being able to be lifted up to allow the contents to fall out on the ground at the site of delivery. Dump trucks come in many different configurations with each one specified to accomplish a specific task in the construction chain.

**Standard dump truck**

The standard dump truck is a full truck chassis with the dump body mounted onto the frame. The dump body is raised by a hydraulic ram lift that is mounted forward of the front bulkhead, normally between the truck cab and the dump body. The standard dump truck also has one front axle, and one or more rear axles which normally have dual wheels on each side. The common configurations for standard dump trucks include the six wheeler and ten wheeler.

**Transfer dump truck**

For the amount of noise made when transferring, the transfer dump truck is easy to recognize. It's a standard dump truck that pulls a separate trailer which can be loaded with sand, asphalt, gravel, dirt, etc. The B box or aggregate container on the trailer is powered by an electric motor and rides on wheels and rolls off of the trailer and into the main dump box. The biggest advantage with this configuration is to maximize payload capacity without having to sacrifice the maneuverability of the short and nimble dump truck standards.

**Semi trailer end dump truck**

The semi end dump truck is a tractor trailer combination where the trailer itself contains the hydraulic hoist. The average semi end dump truck has a 3 axle tractor that pulls a 2 axle semi trailer. The advantage to having a semi end dump truck is rapid unloading.

**Semi trailer bottom dump truck**

A bottom dump truck is a 3 axle tractor that pulls a 2 axle trailer with a clam shell type dump gate in the belly of the trailer. The biggest advantage of a semi bottom dump truck is the ability to lay material in a wind row. This type of truck is also maneuverable in reverse as well, unlike the double and triple trailer configurations.

**Double and triple trailer**

The double and triple bottom dump trucks consist of a 2 axle tractor pulling a semi axle semi trailer and an additional trailer. These types of dump trucks allow the driver to lay material in wind rows without having to leave the cab or stop the truck. The biggest disadvantage is the difficulty in going in reverse.

**Side dump trucks**

Side dump trucks consist of a 3 axle trailer pulling a 2 axle semi trailer. It offers hydraulic rams that tilt the dump body onto the side, which spills the material to the left

or right side of the trailer. The biggest advantages with these types of dump trucks are that they allow rapid unloading and carry more weight than other dump trucks.

In addition to this, side dump trucks are almost impossible to tip over while dumping, unlike the semi end dump trucks which are very prone to being upset or tipped over. The length of these trucks impede maneuverability and limit versatility.

**Off road dump trucks**

Off road trucks resemble heavy construction equipment more than they do highway dump trucks. They are used strictly for off road mining and heavy dirt hauling jobs, such as excavation work. They are very big in size and perfect for those times when you need to dig out roads and need something to haul the massive amounts of dirt to another location.

2. Fill in the table.

| Types of Dump Trucks | Distinctive Features | Function | Advantages | Disadvantages |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

3. Work in pairs. Discuss advantages and disadvantages of dump trucks. Choose the one you think to be the best. Justify your opinion.

## 2.3. VARIOUS TYPES OF CRANES

- **Vocabulary**

1. Guess the words and give their meaning.

| | | |
|---|---|---|
| cable | compact | rail |
| to lift | pump | cylinder |
| to manufacture | component | mechanism |
| to fix | station | vertically |
| fixed | truss | horizontally |
| to control | platform | to stabilize |
| operator | mobile | section |
| cab | mobility | machinery |
| to activate | normally | rotation |

2. Match the names of cranes given in English with their Russian equivalents and learn them by heart.

| | |
|---|---|
| tower crane | подвесной кран |
| mobile crane | мостовой кран |
| loader crane | башенный кран |
| rough terrain crane | автомобильный кран |
| truck mounted crane | телескопический кран |
| overhead crane | подвижной грузоподъемный кран |
| suspended crane | вездеходный кран |
| telescopic crane | гусеничный кран |
| balance crane | кран на колесном ходу |
| tracked crane | кран с противовесом |
| wheeled crane | погрузочный кран |

3. Learn the words given in italics.

| | | | |
|---|---|---|---|
| *derrick* - | подъемная стрела | hydraulic fluid - | гидравлическая жидкость |
| pulley - | ременный шкив | assembly area - | место сборки |
| *to mount* - | монтировать | trench - | траншея |
| pendant control station - | подвесная станция управления | to retract - | втягивать |
| *boom* - | стрела (крана) | to hinge - | прикреплять на петлях |
| to extend boom - | увеличивать вылет стрелы | *backfill blade* - | отвал для обратной засыпки грунта |
| *boom swing* - | поворот стелы крана | *vehicle* - | транспортное средство |
| at angles - | под углом | *outriggers* - | выносная стрела |

| | | | |
|---|---|---|---|
| radio type control | радиоуправление | asset - | ценный вклад |
| cat trucks - | марка тяжелых грузовиков компании Caterpillar | *undercarriage* - | шасси/ходовая часть |
| articulated arm - | шарнирный рычаг | | |

- **Text**

1. Read and translate the text:

A crane is a tower or derrick that is equipped with cables and pulleys that are used to lift and lower material. They are commonly used in the construction industry and in the manufacturing of heavy equipment. Cranes for construction are normally temporary structures, either fixed to the ground or mounted on a purpose built vehicle.

They can either be controlled from an operator in a cab that travels along with the crane, by a push button pendant control station, or by radio type controls. The crane operator is ultimately responsible for the safety of the crews and the crane.

**Mobile Cranes**

The most basic type of crane consists of a steel truss or telescopic boom mounted on a mobile platform, which could be a rail, wheeled, or even on a cat truck. The boom is hinged at the bottom and can be either raised or lowered by cables or hydraulic cylinders.

**Telescopic Crane**

This type of crane offers a boom that consists of a number of tubes fitted one inside of the other. A hydraulic mechanism extends or retracts the tubes to increase or decrease the length of the boom.

**Tower Crane**

The tower crane is a modern form of a balance crane. When fixed to the ground, tower cranes will often give the best combination of height and lifting capacity and are also used when constructing tall buildings.

**Truck Mounted Crane**

Cranes mounted on a rubber tire truck will provide great mobility. Outriggers that extend vertically or horizontally are used to level and stabilize the crane during hoisting.

**Rough Terrain Crane**

A crane that is mounted on an undercarriage with four rubber tires, designed for operations off road. The outriggers extend vertically and horizontally to level and stabilize the crane when hoisting. These types of cranes are single engine machines where the same engine is used for powering the undercarriage as it is for powering the crane. In these types of cranes, the engine is normally mounted in the undercarriage rather than in the upper portion.

**Loader Crane**

A loader crane is a hydraulically powered articulated arm fitted to a trailer, used to load equipment onto a trailer. The numerous sections can be folded into a small space when the crane isn't in use.


**Overhead Crane**

Also referred to as a suspended crane, this type is normally used in a factory, with some of them being able to lift very heavy loads. The hoist is set on a trolley which will move in one direction along one or two beams, which move at angles to that direction along elevated or ground level tracks, often mounted along the side of an assembly area.

In the excavation world, cranes are used to move equipment or machinery. Cranes can quickly and easily move machinery into trenches or down steep hills, or even pipe. There are many types of cranes available, serving everything from excavation to road work.

Cranes are also beneficial to building bridges or construction. For many years, cranes have proven to be an asset to the industry of construction and excavating. Crane operators make really good money, no matter what type of crane they are operating.

2. Fill in the table.

| Types of cranes | Distinctive features | Function |
|---|---|---|
| | | |
| | | |
| | | |

3. Answer the questions:

1. What is the main purpose of cranes?
2. Where can they be used for?
3. Are cranes permanent structures?
4. What cranes can be used for constructing tall buildings?
5. What cranes are designed for off road works?
6. Where are overhead cranes used?
7. What things do loader cranes load?
8. What cranes provide great mobility?
9. What does a boom of a telescopic crane consist of?

## 2.4. BULLDOZER

- **Vocabulary**

1. Read the words and guess their meaning

| | | |
|---|---|---|
| tractor | attributes | hydraulic |
| excavator | stable | modifications |
| mobility | to evolve | limited |
| to level | automatic transmission | electric motors |

2. Learn the following words:

crawler – гусеничный ход, гусеница
equipped – оборудованный

blade – отвал
rubble – щебень

densely compacted materials – плотно утрамбованные материалы
tracked tractor – гусеничный трактор

tracks - гусеницы
ground holding capability – сцепление с грунтом
mobility – мобильность, маневренность
rough terrain – пересеченная местность

ground pressure – давление на грунт
hydraulic arms – гидравлические манипуляторы
to remove – убирать, удалять
articulation joint – шарнирное сочленение
actuated hydraulically – с гидравлическим приводом
angledozer – бульдозер с поворотным отвалом
to level – выравнивать
irreplaceable – незаменимый

automatic transmission – автоматическая коробка передач
grade control – система управления

- **Text**

1. Read and translate the text:

A bulldozer is a crawler equipped with a large metal plate (known as a blade) used to push large quantities of soil, sand, rubble, or other such material during construction and typically equipped at the rear with a claw-like device (known as a ripper) to loosen densely compacted materials. The term "bulldozer" is often used erroneously to mean any heavy equipment (sometimes a loader and sometimes an

excavator), but precisely, the term refers only to a tractor (usually tracked) fitted with a dozer blade.

The tracks give them excellent ground holding capability and mobility through very rough terrain. Wide tracks help distribute the bulldozer's weight over a large area (decreasing ground pressure), thus preventing it from sinking in sandy or muddy ground.

Because of these attributes, bulldozers are often used in road building, construction, mining, forestry, land clearing and any other projects requiring highly mobile, powerful, and stable earth-moving equipment.

Bulldozers have been further modified over time to evolve into new machines which can work in ways that the original bulldozer cannot.

One example is that loader tractors were created by removing the blade and substituting a large volume bucket and hydraulic arms which can raise and lower the bucket, thus making it useful for scooping up earth and loading it into trucks.

Other modifications to the original bulldozer include making it smaller to let it operate in small work areas where movement is limited.

Another type of bulldozer is the wheeled bulldozer, which generally has four wheels driven by a 4-wheel-drive system and has a hydraulic system. The blade is mounted forward of the articulation joint, and is hydraulically actuated.

Some lightweight forms of bulldozer are commonly used in snow removal and as a tool for preparing winter sports areas for ski and snowboard sports.

There is a modification of dozer (an angledozer) where the blade can be pushed forward at one end to make it easier to push material away to the side.

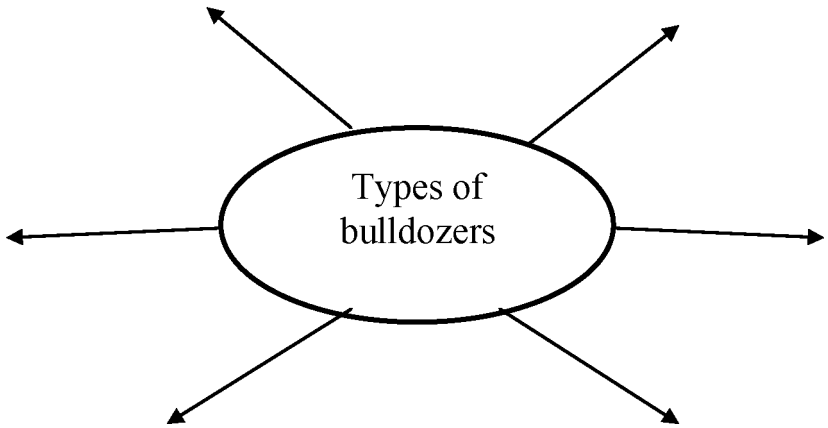
Nevertheless, the original earthmoving bulldozers are still irreplaceable as their tasks are concentrated in deforestation, earthmoving, ground levelling, and road carving. Heavy bulldozers are mainly employed to level the terrain to prepare it for construction. Over the years, bulldozers grew more sophisticated. Improvements include an automatic transmission instead of a manual transmission, blade movement controlled by hydraulic cylinders or electric motors instead of early models' cable winch/brake, and automatic grade control. A more recent innovation is the outfitting of bulldozers with GPS technology.

2. Translate from Russian into English

Оборудованный большой металлической пластиной; плотно утрамбованный; использовать ошибочно; маневренность на пересеченной местности; распределить вес бульдозера; уменьшить давление на грунт; мобильная и мощная землеройная техника; большой по объему ковш; поднимать и опускать ковш; загружать в грузовики; колесный бульдозер; уборка снега;

незаменимая строительная техника; выравнивать площадку под строительство; оснащение бульдозеров автоматической системой управления.

3. Fill in the spidergram:




4. Answer the following questions:

1) What are the main parts of a bulldozer?
2) What are the tracks of a bulldozer used for?
3) Where are bulldozers often used?
4) What kinds of bulldozers do you know?
5) What do advanced bulldozers include?

## Контрольные вопросы к разделу «BUILDING MATERIALS»

1. What two main groups are all building materials divided into?
2. What three main groups are all building materials divided into?
3. What natural building materials do you know?
4. What artificial building materials do you know?
5. What disadvantages does wood have?
6. What properties does stone have?
7. What stones are used for masonry units?
8. What two groups are all metals divided into?
9. What characteristics do non-ferrous metals have?
10. Where is timber used?
11. What are the benefits of wood usage in construction?
12. What are the types of plastics?
13. Where are plastics used?
14. What modern types of plastics do you know?
15. What new types of glass do you know?
16. What are the main properties of steel framing?
17. Where is steel construction most often used?
18. What modern types of concrete do you know?
19. Where can glass concrete be used?
20. What type of concrete can be textured to replicate a stone, wood or brick?

**Контрольные вопросы к разделу «CONSTRUCTION EQUIPMENT»**

1. What construction equipment do you know?
2. What machines does compacting equipment include?
3. What functions do heavy machines perform?
4. What machines does earthmoving equipment include?
5. Is excavation equipment divided into three main classes?
6. What kinds of dump trucks do you know?
7. What dump trucks are the most efficient from your point of view?
8. What does the common configuration for standard dump truck include?
9. How can we recognize transfer dump truck?
10. What does the semi-end dump truck have?
11. What is the biggest advantage of semi-trailer bottom dump truck?
12. What is the biggest disadvantage of double and triple dump trucks?
13. What dump trucks can carry more weight than others?
14. What dump trucks are used for off road mining?
15. What is the main purpose of cranes?
16. Where are cranes used?
17. Are cranes permanent structures?
18. Where are bulldozers often used?
19. What kinds of bulldozers do you know?
20. What do advanced bulldozers include?

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## Список использованных источников


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