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Кафедра иностранных языков

АНГЛИЙСКИЙ ЯЗЫК

Задание № 123 для студентов II курса специальностей 270113 – механизация и автоматизация строительства и 190205 – подъемно-транспортные, строительные, дорожные машины и оборудование

Санкт-Петербург
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Английский язык. Задание № 123 для студентов II курса специальностей 270113 – механизация и автоматизация строительства и 190205 – подъемно-транспортные, строительные, дорожные машины и оборудование / СПбГАСУ; сост. Л. Р. Данилова – СПб., 2010. – 52 с.

Задание предназначено для аудиторного чтения студентами II курса специальностей 270113 – механизация и автоматизация строительства и 190205 – подъемно-транспортные, строительные, дорожные машины и оборудование, и развития навыков технического перевода со словарем и без словаря. В задании использованы тексты, взятые из оригинальной литературы.

Каждый урок включает тексты, лексические и грамматические упражнения, лексику по данным специальностям.
The Power Source may consist of an internal combustion engine that can be powered by gas, gasoline or diesel fuel. Electric forklifts are powered by either a battery or fuel cells that provide power to the electric motors. The electric motors used on a forklift may be either DC or AC types.

The Tilt Cylinders are hydraulic cylinders that are mounted to the truck frame and the mast. The tilt cylinders pivot the mast to assist in engaging a load.

The Mast is the vertical assembly that does the work of raising and lowering the load. It is made up of interlocking rails that also provide lateral stability. The interlocking rails may either have rollers or bushings as guides. The mast is either hydraulically operated by one or more hydraulic cylinders or it may be chain operated with a hydraulic motor providing motive power. It may be mounted to the front axle or the frame of the forklift.

The Carriage is the component to which the forks or other attachments are mounted. It is mounted into and moves up and down the mast rails by means of chains or by being directly attached to the hydraulic cylinder. Like the mast, the carriage may have either rollers or bushings to guide it in the interlocking mast rails.

The Load Back Rest is a rack-like extension that is either bolted or welded to the carriage in order to prevent the load from shifting backward when the carriage is lifted to full height.

Active vocabulary:
- utilize – использовать
- lift – поднимать
- protrude – выдвигать
- warehouse – склад
- shift – сдвиг; сдвигать
- prong – зубец, вилы
- insert – вставлять
- solid – твердый, сплошной, целый
- pneumatic – пневматический
- protection – защита
- prevent – предотвращать
- tilt – наклонять, опрокидывать
- guard – предохранительное приспособление
- fluid – жидкость
- switch – переключатель, переключать
- engage – зацеплять, занимать
- roller – ролик, каток
- carriage – шасси, рама, несущее устройство
- rest – опора, подставка, стойка
- weld – сваривать

Exercise 1. Answer the following questions:
1. Where are forklift trucks used?
2. How may forklifts be powered?
3. What main components of a forklift do you know?
4. What is the purpose of the counterweight?
5. What may the power source consist of?
6. What component does the work of raising and lowering the load?

Exercise 2. Define the part of speech of the following words:
Attachment, basically, outwards, application, specific, similar, extensively, construction, internal, capacity, particular, hydraulically, pneumatic, essential, equipment, operator, electrically, combustion, external, prevention, balance, lateral, stability, different, extension, carriage, backward, stability, various, structure, replaceable.

Exercise 3. Define the tense of the predicates and translate the following sentences:
1. Forklift trucks are designed for different applications.
2. Warehouses needed more efficient equipment.
3. The machine was operated according to the rules which had been specified by the manufacturer.
4. During World War I different types of material handling equipment were being developed.
5. Forklift trucks employment will be expanded by adding new attachments.
6. Forklift trucks will tilt when a specified lifting capacity has been exceeded.
The cab contains a seat for the operator.
The carriage is moving up and down the mast rails.
By 1967 Toyota had introduced its forklift truck both in Japan and in the USA.
Installation of rails has ensured operator’s protection.
While working the operator is being protected by the overhead guard.
Through the 1920s and 1930s different companies were developing forklift trucks.

Exercise 4. Translate Text B without a dictionary

Text B

FORKLIFT DEVELOPMENT
The middle 19th century through the early 20th century saw the developments that led to today’s modern forklifts. The Pennsylvania Railroad in 1906 introduced battery powered platform trucks for moving luggage at their Altoona, Pennsylvania train station. World War I saw the development of different types of material handling equipment in the United Kingdom by Ransomes, Sims and Jeffries of Ipswich. This was in part due to the labour shortages caused by the war. In 1917 Clark in the United States began developing and using powered tractor and powered lift tractors in their factories. In 1919 the Towmotor Company and Yale & Towne Manufacturing in 1920 entered the lift truck market in the United States.
Constant development and expanded use of the forklift continued through the 1920s and 1930s. World War II, like World War I before, accelerated the use of forklift trucks in the war events. Following the war, more efficient methods for storing products in warehouses were being applied. Warehouses needed more maneuverable forklift trucks that could reach greater heights. New forklift models were made to meet this need. In 1956 Toyota introduced its first lift truck model, the Model LA, in Japan and sold its first forklift in the United States in 1967.

Notes:
luggage – багаж
labour shortage – нехватка рабочей силы
store – хранить
a drum for transport. Another type grabs around the drum in a manner similar to the roll or barrel attachments.

**Man Basket** is a lift platform that slides onto the forks and is meant for hoisting workers. The man basket has railings to keep the person from falling and brackets for attaching a safety harness. Also, a staple or chain is used to attach the man basket to the carriage of the forklift.

**Telescopic Forks** are hydraulic attachments that allow the operator to operate in warehouse design for “double-deep stacking”, which means that two pallet shelves are placed behind each other without any aisle between them.

**Active Vocabulary:**

<table>
<thead>
<tr>
<th>English</th>
<th>Russian</th>
</tr>
</thead>
<tbody>
<tr>
<td>available</td>
<td>доступный, имеющийся в распоряжении</td>
</tr>
<tr>
<td>skid</td>
<td>направляющая рейка (рельс)</td>
</tr>
<tr>
<td>adjust</td>
<td>приспосабливать, регулировать</td>
</tr>
<tr>
<td>roll</td>
<td>рулон</td>
</tr>
<tr>
<td>barrel</td>
<td>бочка</td>
</tr>
<tr>
<td>clamp</td>
<td>зажим, хомут, скоба</td>
</tr>
<tr>
<td>squeeze</td>
<td>сжимать, сдавливать</td>
</tr>
<tr>
<td>item</td>
<td>предмет, вопрос</td>
</tr>
<tr>
<td>store</td>
<td>запас; хранить</td>
</tr>
<tr>
<td>pole</td>
<td>столб, шест</td>
</tr>
<tr>
<td>bale</td>
<td>кипа, тюк</td>
</tr>
<tr>
<td>spring</td>
<td>пружина, рессора</td>
</tr>
<tr>
<td>jaw</td>
<td>захват, зажим</td>
</tr>
<tr>
<td>grip</td>
<td>тиски, зажим, захват; сжимать</td>
</tr>
<tr>
<td>edge</td>
<td>край, кромка</td>
</tr>
<tr>
<td>grab</td>
<td>захват; захватывать</td>
</tr>
<tr>
<td>staple</td>
<td>скоба, крюк</td>
</tr>
<tr>
<td>aisle</td>
<td>проход</td>
</tr>
</tbody>
</table>

**Exercise 1. Answer the following questions:**

1. What attachment allows the operator to move the forks?
2. How can round items be handled?
3. What is used for dumping containers?
4. How does the slip sheet attachment work?
5. How is the safety of workers ensured?
6. How are the most forklift attachments powered?

**Exercise 2. Translate the following sentences paying attention to modal verbs:**

1. A telescopic boom can extend forwards and upwards from the vehicle.
2. This type of attachment may also have a rotation function.
3. The forklift and load must be considered a unit with one varying centre of gravity.
4. Using a sideshifter the operator doesn’t have to reposition the truck.
5. The operator should take into account the weight, boom angle and height.
6. The manufacturer is to provide load specifications.
7. Labour shortages caused by war could be compensated by using powered tractors.
8. The operator is allowed to move the forks laterally.
9. With fork positioner the operator will be able to manually adjust the forks for different sizes of loads.

**Exercise 3. Translate the following sentences paying attention to the italicized words:**

1. Here is the list of necessary equipment.
2. Can you list the main components of a forklift?
3. This hydraulic attachment loads the drums.
4. Forklift trucks are designed for particular loads.
5. Rigid chassis design has become more popular.
6. For some handling needs forklifts are fitted with a rotator.
7. A loader needs some counterweight for better stability.
8. Two pallet shelves are placed behind each other.
9. There is no place for larger equipment.
10. With these attachments in use, the forklift truck is sometimes called a clamp truck.
11. Most forklift trucks used have load capacities between one to five tons.
Exercise 4. Translate Text B without a dictionary:
Text B

FORKLIFT TRUCK OPERATION
Forklift trucks are available in many variations and load capacities. In a typical warehouse most forklifts used have load capacities between one to five tons. Larger machines, up to 50 tons lift capacity are used for lifting heavier loads. In addition to a control to raise and lower the forks (also known as blades or tines), the operator can tilt the mast to compensate for a load’s tendency to move the blades toward the ground and risk slipping off the forks. Tilt also provides a limited ability to operate on non-level ground.

Forklifts are rated for loads at a specified maximum weight and a specified forward centre of gravity. This information is located on a nameplate provided by the manufacturer, and loads must not exceed these specifications.

An important aspect of forklift operation is that most have rear-wheel steering. While this increases maneuverability in tight cornering situations, it differs from a driver’s traditional experience with other wheeled vehicles. While steering, as there is no caster action, it is unnecessary to apply steering force to maintain a constant rate of turn.

Another critical characteristic of the forklift is its instability. The forklift and load must be considered a unit with a continually varying centre of gravity with every movement of the load. A forklift is not normally designed for turning at a high speed when moving with a load that is raised. In such a state, the gravitational and the centrifugal forces can combine to produce a tip-over accident. The forklifts are designed with a load limit for the forks which is decreased with fork elevation and undercutting of the load. A loading plate for loading reference is usually located on the forklift. A forklift should not be used as a personnel lift without the fitting of specific safety equipment, such as a cage.

Notes:
- tine – зубец
- tight – тесный
- cage – клеть

Exercise 5. Translate Text C with a dictionary and make its grammar analysis:
Text C

TELESCOPIC HANDLER
1. A telescopic handler, or telehandler, is a machine widely used in agriculture and industry. 2. It is similar in appearance and function to a forklift, but it is more a crane than a forklift, with the increased versatility of a single telescopic boom that can extend forwards and upwards from the vehicle. 3. On the end of the boom the operator can fit one of several attachments, such as a bucket, pallet forks, a muck grab, or a lift table. 4. The most common attachment for a telehandler is pallet forks and the most common application is to move loads to and from places unreachable for a conventional forklift. 5. For example, telehandlers have the ability to remove palletized cargo from within a trailer and to place loads on rooftops and other high places. 6. The latter application would otherwise require a crane, which is not always practical or time-efficient. 7. The advantage of the telehandler is also its biggest limitation: as the boom extends or rises while bearing a load, it acts as a lever and causes the vehicle to become increasingly unstable, despite counterweights in the rear. 8. This means that the lifting capacity quickly decreases as the working radius (distance between the front of the wheels and the centre of the load) increases. 9. A vehicle with a 5,000lb capacity with the boom retracted may be able to safely lift as little as 400lb with it fully extended at a low boom angle. 10. The same machine with a 5,000lb lift capacity (with the boom retracted) may be able to support as much as 10,000lb with the boom raised to 70°. 11. The operator is equipped with a load chart which helps him to determine whether a given task is possible, taking into account weight, boom angle and height. 12. Failing this, most telehandlers utilize a computer which uses sensors to monitor the vehicle, and will warn the operator and/or cut off further control input if the limits of the vehicle are exceeded. 13. Some machines are also equipped with front outriggers and can be called mobile cranes, which extends the equipment’s lifting capacity when used stationary. 14. Telehandlers were pioneered by the Matbro company at Horley in Surrey, England who developed them from their articulated cross country forestry forklifts. 15. At first they had a centrally mounted boom on the
front section, with the driver’s cab on the rear section, as in the Teleram 40, but the rigid chassis design with a rear mounted boom and cab to the side has become more popular.

1. Function of “be”; adverb with suffix.
2. Nouns with suffixes; comparative degree; modal verb.
3. Noun groups.
4. Degree of comparison; adjectives with suffixes.
5. Infinitives (function).
6. Function of “would”.
7. Degree of comparison; infinitive (function); participle I (function).
8. Meaning of “as”; main and subordinate clauses.
9. Modal verbs; participle II (function); noun group.
10. Participle II (function).
11. Subjects and predicates; participles I, II (function).
12. Predicates; degree of comparison; infinitives (function); participle I (function).
13. Meaning of “s”: participle II.
15. Possessive case; meaning of “have”.

Unit 3
Grammar: Degrees of Comparison.

Text A
LOADERS
Part I
A loader is a heavy equipment machine (often used in construction) that is primarily used to load material (asphalt, demolition debris, dirt, gravel, logs, raw minerals, recycled material, rock, sand, wood chips, etc.) into or onto another type of machinery (dump truck, conveyor belt, feed-hopper, rail-car, etc.).

A front loader is a type of tractor, usually wheeled, sometimes on tracks, that has a front mounted square wide bucket connected to the end of two booms (arms) to scoop up loose material from the ground, such as dirt, sand or gravel, and move it from one place to another without pushing the material across the ground. A loader is commonly used to move a stockpiled material from the ground level and deposit it into an awaiting dump truck or into an open trench excavation.

The loader assembly may be a removable or permanently mounted attachment. Often the bucket can be replaced with other devices or tools. For example, many can mount forks to lift heavy pallets or shipping containers. A hydraulically-opening clamshell bucket allows a loader to act as a light dozer or scraper. The bucket can also be fitted with such devices as a bale grappler for handling large bales.

Large loaders, such as the Kawasaki 95ZV-2, John Deere 844K, Caterpillar 950H, Volvo L120E, Case 921E, or Hitachi ZW310 usually have only a front bucket and are called front loaders, whereas small loader tractors are often also equipped with a small backhoe and are called backhoe loaders or loader backhoes.

The largest loader in the world is LeTourneau L-2350. Currently these large loaders are in production in the Longview, Texas facility. The L-2350 uses a diesel electric propulsion system similar to that used in a locomotive. Each rubber tired wheel is driven by its own independent electric motor.

Part II
Loaders are used not only for loading materials into trucks, but for laying pipes, clearing rubble, and digging. A loader is not the most efficient machine for digging as it cannot dig very deep below the level of its wheels, like a backhoe can. Their deep bucket can usually store about 3-6 cubic metres (exact number varies with the model) of earth. The front loader’s bucket capacity is much bigger than that of a backhoe loader. Loaders are not classified as earthmoving machinery, as their primary purpose is other than earthmoving.

Unlike most bulldozers, most loaders are wheeled and not tracked, although track loaders are common. They are successful where sharp edged materials in construction debris would damage rubber wheels, or where the ground is soft and muddy. Wheels provide better mobility and speed and do not damage paved roads as much as tracks, but provide less traction. In construction areas loaders are also used to transport building materials – such as bricks, pipes, metal bars, and digging tools – over short distances. Loaders are also used for snow removal, using their bucket or a
snowbasket, but usually using a snowplow attachment. They clear snow from streets, highways and parking lots. They sometimes load snow into dump trucks for transport.

High-tip buckets are suitable for light materials such as chip, peat and light gravel and when the bucket is emptied from a height. Unlike backhoes or standard tractors fitted with a front bucket, many large loaders do not use automotive steering mechanisms. Instead, they steer by a hydraulically actuated pivot point set exactly between the front and rear axles. This is referred to as “articulated steering” and allows the front axle to be solid, allowing it to carry greater weight. Articulated steering provides better maneuverability for a given wheelbase. Since the front wheels and the attachment rotate on the same axis, the operator is able to “steer” his load in an arc after positioning the machine, which can be useful. When the machine is “twisted” to one side and a heavy load is lifted high, it has a greater risk of turning over to the “wide” side. Front loaders gained popularity during the last two decades, especially in urban engineering projects and small earthmoving works. Many heavy equipment manufacturers offer a wide range of loaders, the most known are those of John Deere, Caterpillar, Case, Volvo, Komatsu, Liebherr, JCB and Kawasaki.

**Active Vocabulary:**

- demolition – разрушение, снос
- conveyor – конвейер
- feed – питать, снабжать
- hopper – воронка, бункер
- front loader – фронтальный погрузчик
- loose – рыхлый; освобождать
- stockpile – штабель; накапливать, штабелировать
- trench – ров, траншея
- permanent – постоянный
- propulsion – продвижение
- rubber – резина
- exact – точный
- sharp – острый
- damage – вред, ущерб

**Exercise 1. Answer the following questions:**

1. What is the loader primarily used for?
2. What devices or tools can the bucket be replaced with?
3. What loader is called a backhoe?
4. Where is the largest loader produced?
5. What propulsion system does the L-2350 use?
6. What other jobs are loaders used for?
7. What machine is better for digging, a loader or a backhoe?
8. What running gear is the most common for loaders?
9. What does the articulated steering provide?
10. Where did front loaders gain the greatest popularity?

**Exercise 2. a) Read Text A (part II) and find the adjectives in the comparative and the superlative degrees.**

**b) Give the comparative and the superlative degree of the following adjectives from Text A:**

Heavy, wide, light, large, small, independent, deep, successful, sharp, soft, much, short, many, solid, useful, popular, compact, traditional, similar, available, simple, quick.

**Exercise 3. Translate the following sentences:**

1. Warehouses needed more maneuverable forklift trucks than the equipment used earlier.
2. The sideshifter allows an easier placement of a load.
3. Loading should be carried out as quickly as possible.
4. The larger machines are used, the heavier loads are lifted.
5. A telescopic handler is more a crane than a forklift.
6. The advantage of the telehandler is also its biggest limitation.
7. The more the working radius increases, the more quickly the lifting capacity decreases.
8. Most telehandlers utilize a computer which will warn the operator and stop further work if necessary.
9. A front loader is more often a wheeled tractor than a track mounted one.
10. Loaders are not so efficient for digging as backhoes.
11. Wheels provide better mobility than tracks.

Exercise 4. Translate Text B without a dictionary:

Text A
EXCAVATORS
An excavator is in a list of extremely useful machines utilized in the construction industry, and other useful applications. It has increased the speed of work to a great extent. Efforts have to be made to reduce the excavator weight, and make it a quiet function. It consists of an undercarriage that has wheels or tracks for the provision of mobility. Active research is being constantly conducted to improve the excavator characteristics, namely more ground clearance, less noise, and improvement in ride. The older excavators had an extended counterweight that was suspended at the machine rear. It was to provide additional lifting capability and the force for digging. The modern excavators have been designed so that the counterweight remains inside the track width during swinging. Thus the movement is safe and the maneuverability of the excavator increases during operation in restricted areas. The common excavators are fitted with diesel engines that generate hydraulic pressure for the numerous excavator operations. In modern excavators there are electric motors that obtain power by fuel cells. The fuel cells are efficient and environmentally friendly. Furthermore, the fuel cells are much lighter and smaller than a diesel engine. The operator cabin is being made more spacious and comfortable.

The fundamental mechanism of an excavator consists of the undercarriage that includes the tracks, track frame, blade and the final drive. The final drive has a hydraulic motor and gears that provide drive to the tracks. The operator’s cabin, engine, counterweights, hydraulic and fuel tanks are to be attached to the undercarriage to enable the excavator to swing 360° without any hindrance. The main function of the excavator engine is to drive the hydraulic pumps that provide oil at a high pressure to the slew motor, rams, track motors, and several accessories. Mostly, the boom can move only up and down, or in addition also shift towards the left and right of the machine. An arm is attached to the boom end that imparts the force for digging into the ground. A bucket is fixed at the arm end for

Text B
COMPACT UTILITY TRACTORS
Popular additions to compact utility tractors and farm tractors are Front End Loaders, also referred to as a FEL. Compact Utility Tractors, also called CUTs are small tractors, typically with 18 to 50 horsepower (37 kW) and used primarily for grounds maintenance and landscape work. There are 2 primary designs of compact tractor FELs, the traditional designed style and the curved arm style.
John Deere Tractor manufactures a semi-curved loader design that does not feature the one piece curved arm, but also is not of the traditional two piece design. New Holland AG introduced a compact loader with a single piece curved arm on its compact utility tractors. Similar one piece curved arm loaders are now available on compact tractors on many brands including Case/Farmall, and some Montana and Kioti tractors. Kubota markets traditional loader designs on most of its compact tractors but now features a semi-curved loader design similar to the John Deere loader design on several of its small tractors.
While front end loaders on CUT size tractors are capable of many tasks, given their relatively small size and low capacities when compared to commercial loaders, the compact loaders can be made more useful with some simple options. A toothed bar is commonly added to the front edge of a loader bucket to aid with digging. Some loaders are equipped with a quick coupler, otherwise known as a Quick Attach (QA) system, the QA system allows the bucket to be removed easily and other tools to be added in its place. Common additions include a set of Pallet Forks for lifting pallets of goods.

Notes:
utility — утилитарный, практичный, простой
semi- — полу-
coupler — соединительная муфта, зажим
carrying the soil. In addition, there are numerous other categories of attachments with the excavator that are used for boring, crushing, lifting and ripping. In recent years, hydraulic excavator capabilities have expanded far beyond excavation tasks with buckets. The range of attachments had to be enlarged to make this possible. With the appearance of hydraulic powered attachments such as a breaker, a grapple or an auger, the excavator is frequently used in many applications other than excavation.

**Active Vocabulary:**
- extent – степень, мера
- effort – усилие, попытка
- quiet – тихий
- research – исследование
- restrict – ограничивать
- generate – производить, генерировать
- cell – элемент, батарея
- final drive – главная передача
- hindrance – помеха, препятствие
- pump – насос
- accessories – принадлежности
- impart – давать, придавать
- bore – сверлить, бурить
- crush – дробить, размельчать
- appearance – появление, внешний вид
- auger – сверло, бурав

**Exercise 1. Answer the following questions:**
1. How has an excavator influenced the speed of work?
2. What does an excavator consist of?
3. What excavator characteristics need improvement?
4. Why are modern excavators equipped with fuel cells?
5. What components does the undercarriage include?
6. How can the boom move?
7. What attachments have expanded excavator applications?

**Exercise 2. Read Text A and define the functions of the underlined verbs “to be” and “to have”.

**Exercise 3. Translate the following sentences and define the functions of ed-forms:**
1. Powered machines have increased the speed of work to a great extent.
2. Quick-attach systems simplified attachments mounting.
3. A bucket is fixed at the arm end.
4. The machine could not swing when used in tight turn areas.
5. Modern excavators are fitted with electric motors.
6. The counterweight provided additional lifting capacity.
7. Machines are more environmentally friendly if fitted with fuel cells.
8. Hydraulic devices have expanded excavator applications.
9. A loader is a machine employed in construction.

**Exercise 4. Translate Text B without a dictionary:**

**Text B**

**EXCAVATOR APPLICATION**

Excavators are used extensively in numerous fields, including the following:
- wood removal in forests
- normal grading work and landscaping
- demolition of structures, and removal of debris
- mining industry
- dredging of rivers
- installation of piles in foundations
- digging of foundations, holes and trenches
- handling of heavy materials
- laying of heavy pipes

Many excavators feature quick-attach mounting systems for simplified attachment mounting, dramatically increasing the machine’s utilization on the jobsite. Excavators are usually employed together with loaders and bulldozers. Most wheeled versions, and smaller, compact excavators have a small backfill (or dozer-) blade. This is a horizontal bulldozer-like
blade attached to the undercarriage and is used for pushing removed material back into a hole. Prior to the 1990s, all excavators had a hang over, or conventional counterweight that hang off the rear of the machine to provide more digging force and lifting capacity. This became a hindrance in tight turn areas – the machine could not swing the second half of its cycle due to restricted turn radius. In the early 1990s The Komatsu Engineering Company launched a new concept excavator line that did away with the conventional counterweight design, and so started building the world’s fist tight tail swing excavators (PC128, PC138, PC228, PC308). These machines are now widely used throughout the world.

Notes:
debris – обломки, строительный мусор
dredge – углублять
hang – вешать

Unit 5
Grammar: Ing-forms

Text A

COMPACT EXCAVATOR

Excavators come in a wide variety of sizes. The smaller ones are called mini-excavators or compact excavators.

A compact hydraulic excavator or mini excavator is a tracked or wheeled vehicle with an approximate operating weight from 0.7 to 7.5 tonnes. It generally includes a standard backfill blade and features independent boom swing. The compact hydraulic excavator is also referred to as a mini excavator.

The compact hydraulic excavator is somewhat different from other construction equipment in that all movements and functions of the machine are accomplished through the transfer of hydraulic fluid. The compact excavator’s workgroup and blade are activated by hydraulic fluid acting upon hydraulic cylinders. The excavator’s slew (rotation) and travel functions are also activated by hydraulic fluid powering hydraulic motors. Most compact hydraulic excavators have three distinct assemblies: house, undercarriage and workgroup.

The house structure contains the operator’s compartment, engine compartment, hydraulic pump and distribution components. The house structure is attached to the top of the undercarriage via a swing bearing. The house, along with the workgroup, is able to rotate or slew upon the undercarriage without limit due to a hydraulic distribution valve supplying oil to the undercarriage components.

Slewing refers to rotating the excavator’s house assembly. Unlike a conventional backhoe, the operator can slew the entire house and workgroup upon the undercarriage for spoil placement.

The undercarriage consists of rubber or steel tracks, drive sprockets, rollers, idlers and associated components/structures. The undercarriage supports the house structure and the workgroup.

The workgroup of a compact hydraulic excavator consists of the boom, dipper or arm, and attachment (e.g. auger, bucket or breaker). It is connected to the front of the excavator’s house structure via a swing frame allowing the workgroup to be hydraulically pivoted left or right to achieve offset digging for trenching parallel with the tracks. The primary purpose of boom swing is for offset digging around obstacles or along foundations, walls or forms. A secondary use is cycling in areas too narrow for cab rotation. Independent boom swing is one of the major advantages of a compact excavator over other excavation equipment.

The backfill blade is used for grading, levelling, backfilling, trenching, and general dozer work. The blade can be used to increase dump height and digging depth depending on its position in relation to the excavator’s workgroup, this makes it very versatile.

There are two distinct classes of compact excavators, conventional tail swing units that have a rear counterweight that will extend beyond the tracks when the house rotates, and zero-tail swing units with a house whose diameter stays within the width of the tracks through full rotation. Zero-tail swing units allow the operator to focus on digging and not watching where he or she is swinging.

Active Vocabulary:

approximate – приблизительный; приближаться
backfill – засыпка (траншей)
accomplish – совершать, выполнять
Exercise 1. Answer the following questions:
1. What does a compact excavator include and feature?
2. How does hydraulic excavator differ from some other construction equipment?
3. How is the house structure attached to the top of the undercarriage?
4. What is one of the major advantages of a compact excavator?
5. What is the backfill blade used for?
6. How many and what classes of compact excavators are there?

Exercise 2. Read Text A and define the part of speech and the function of the underlined words.

Exercise 3. Translate the following sentences paying attention to ing-forms:
1. Lifting and moving of heavy loads is accomplished by using a forklift truck.
2. Safety rails and revolving turntables are normally fitted for the prevention of tilting.
3. A counterweight is utilized for balancing the load being lifted.
4. The mast does the work of raising and lowering a load.
5. The interlocking rails may either have rollers or bushings as guides.

Text B

DRAGLINE HISTORY
The dragline was invented in 1904 by John W. Page of Page Schnable Contracting for digging the Chicago Canal. In 1912 it became the Page Engineering Company, and a walking mechanism was developed a few years later, providing draglines with mobility. Page also invented the arched dragline bucket; a design still commonly used today by draglines from many other manufacturers, and in the 1960s pioneered an archless bucket design.

In 1910 Bucyrus International entered the dragline market with the purchase of manufacturing rights for the Heyworth-Newman dragline excavator. Their “Class 14” dragline was introduced in 1911 as the first crawler mounted dragline. In 1912 Bucyrus began to use electricity as a power source for large stripping shovels and draglines used in mining.

In 1914 Harnischfeger Corporation, (established as P&H Mining in 1884 by Alonzo Pawling and Henry Harnischfeger), introduced the world’s first gasoline engine-powered dragline. An Italian company, Fiorentini, from 1919 produced dragline excavators licensed by Bucyrus.

In 1939 the Marion Steam Shovel Dredge Company (established in 1880) built its first walking dragline. The company changed its name to the Marion Power Shovel Company in 1946 and was acquired by Bucyrus in 1997. In 1988 Page was acquired by the Harnischfeger Corp., makers of the P&H line of shovels, draglines, and cranes.
Draglines, unlike most equipment used in earth-moving, have remained relatively unchanged in design and control systems for almost 100 years. Over the last few years, some advances in dragline systems and methodologies have occurred.

UDD stands for Universal-Dig-Dump. It represents the first fundamental change to draglines for almost a century. Instead of using two ropes (the hoist rope and the drag rope) to manipulate the bucket, a UDD machine uses three ropes, two hoists and one drag. This allows the dragline operator to have much greater selectivity in when to pick up the bucket, and in how the bucket may be dumped. UDD machines generally have higher productivity than a standard dragline. The improvements justify their costs.

Notes:
arch — арка, дуга; изгибать дугой
purchase — покупка
strip — полоса; снимать слой
acquire — приобретать

Unit 6
Grammar: Infinitive; Infinitive Constructions.

Text A
DRAGLINE EXCAVATOR

Dragline excavation systems are heavy equipment used in civil engineering and surface mining. In civil engineering the smaller types are used for road and port construction. The larger types are used in strip-mining operations to move overburden (soil layers) above coal. Draglines are amongst the largest mobile equipment, and weigh in the vicinity of 2000 metric tonnes, though specimens weighing up to 13,000 metric tonnes have also been constructed.

A dragline bucket system consists of a large bucket which is suspended from a boom (a large truss-like structure) with wire ropes. The bucket is manoeuvred by means of a number of ropes and chains. The hoist rope, powered by large diesel or electric motors, supports the bucket and hoist coupler assembly from the boom. The drag rope is used to draw the bucket assembly horizontally. By skillful manoeuvre of the hoist and the drag ropes the bucket is controlled for various operations.

In a typical cycle of excavation, the bucket is positioned above the material to be excavated. The bucket is then lowered and the drag rope is then drawn so that the bucket is dragged along the surface of the material. The bucket is then lifted by using the hoist rope. A swing operation is then performed to move the bucket to the place where the material is to be dumped. The drag rope is then released causing the bucket to tilt and empty. This is called a dump operation.

The bucket can also be "thrown" by winding up to the jib and then releasing a clutch on the drag cable. This would then swing the bucket like a pendulum. Once the bucket had passed the vertical, the hoist cable would be released thus throwing the bucket. On smaller draglines, a skilled operator could make the bucket land about one-half the length of the jib further away than if it had just been dropped. On larger draglines, only a few extra metres may be reached.

Draglines have different cutting sequences. The first is the side cast method using offset benches*; this involves throwing the overburden sideways onto blasted material to make a bench. The second is a key pass. This pass cuts at the toe of the new high wall and also shifts the bench further towards the low wall. This may also require a chop pass if the wall is blocky. A chop pass involves the bucket being dropped down onto an angled highwall to scale the surface. The next sequence is the slowest operation. However, this pass moves most of the material. It involves the access to bottom of the material to lift it up to an elevated bench level. The final cut if required is a pull back, pulling material back further to the low-wall side.

The primary limitations of draglines are their boom height and boom length, which limit where the dragline can dump the waste material. Another primary limitation is their dig depth, which is limited by the length of rope the dragline can utilize. A dragline is most efficient excavating material below the level of its base. While a dragline can dig above itself, it does so inefficiently and is not suitable to load piled up material (as a rope shovel can).

Despite their limitations, and their extremely high capital cost, draglines remain popular with many mines, due to their reliability, and extremely low waste removal cost.

*bench — терраса, уступ
Active Vocabulary:

- surface – поверхность
- mining – горное дело, разработка недр
- strip – полоса, снимать (слой)
- specimen – образец, экземпляр
- draw – тащить, тянуть
- release – освобождать, отпускать
- throw – бросать
- skilled – квалифицированный
- drop – падать, ронять
- sequence – последовательность, следование
- involve – включать, вовлекать
- waste – отходы, пустая порода

Exercise 1. Answer the following questions:
1. What types of draglines are used for road construction?
2. What does a dragline bucket system consist of?
3. What means is the bucket manoeuvred by?
4. How is the typical cycle of excavation performed?
5. How many cutting sequences do draglines have?
6. What are the primary limitations of draglines?
7. Why do draglines remain popular?

Exercise 2. Read Text A. Define the forms and functions of the underlined infinitives. Explain the cases when the infinitives are used without particle “to”.

Exercise 3. Translate the following sentences paying attention to the infinitive constructions:
1. The frame may have fuel and hydraulic fluid tanks.
2. The overhead guard helps to protect the operator from falling objects.
3. Pole attachments are used to lift rolls.
4. The tilt provides an ability to operate on non-level ground.
5. While steering, it is unnecessary to apply steering force to maintain a constant rate of turn.
6. To combine the gravitational and centrifugal forces means to produce a tip-over accident.
7. A forklift should not be used as a personnel lift.
8. The most common task of a telescopic handler is to move the loads.

Exercise 4. Translate the following sentences paying attention to the infinitive constructions:
1. This attachment enables the operator to move the forks.
2. As the boom extends it causes the vehicle to become increasingly unstable.
3. A loader is known to be a heavy equipment machine often used in construction.
4. Draglines are considered to be the largest mobile equipment.
5. UDD is claimed to represent the first fundamental change to draglines for almost a century.
6. Two hoist and one drag ropes permit the operator to have better control.

Exercise 5. Translate Text B without a dictionary:
Text B

DRAGLINE EXAMPLES
The coal mining dragline known as Big Muskie, owned by the Central Ohio Coal Company (a division of American Electric Power), was the world’s largest mobile earth-moving machine, weighing nearly 13,000 metric tons and standing nearly 22 stories tall. It operated in Guernsey County, in the US state of Ohio from 1969 to 1991, and was powered by 13,800 volts of electricity.

The British firm of Ransomes & Rapier produced a few large (1400–1800 ton) excavators, the largest in Europe at the time (1960s). Power was from internal combustion engines driving electric generators. One, named Sundew, was used in a quarry from 1957 to 1974. After its working life at the first site in Rutland was finished it walked 13 miles to a new life at Corby; the walk took 9 weeks.

Smaller draglines were also commonly used before hydraulic excavators came into common use, the smaller draglines are now rarely used other
than on river and gravel pit works. The small machines were of a mechanical drive with clutches. Firms such as Ruston and Bucyrus made models such as the RB10 which were popular for small building works and drainage work. Several of these can still be seen in the English Fens of Cambridgeshire, Lincolnshire and parts of Norfolk. Ruston’s is a company also associated with drainage pumping engines. Electric drive systems were only used on the larger mining machines, most modern machines use a diesel-hydraulic drive, as machines are seldom in one location long enough to justify the cost of installing a substation and supply cables.

Notes:

- **pit** — яма, шахта, карьер
- **justify** — оправдывать
- **substation** — подстанция

Exercise 6. Translate Text C with a dictionary and make its grammar analysis:

**Text C**

**DRAGLINES IN MINING**

1. A large dragline system used in the open pit mining industry costs approximately US$50-100 million. 2. A typical bucket has a volume ranging from 30 to 60 cubic metres, though extremely large buckets have ranged up to 168 cubic metres. 3. The length of the boom ranges from 45 to 100 metres. 4. In a single cycle it can move up to 450 metric tonnes of material. 5. Most mining draglines are not diesel-powered like most other mining equipment. 6. Their power consumption is so great that they have a direct connection to the high-voltage grid at voltages of between 6.6 to 22 kV. 7. A typical dragline, with a 55 cubic metre bucket, can use up to 6 megawatts during normal digging operations. 8. Because of this, many stories have been told about the black-out* causing effects of mining draglines. 9. For instance, there is a long-lived story that, back in the 1970s, if all seven draglines at Peak Downs Mine (a very large BHP coal mine in central Queensland, Australia) turned simultaneously, they would black-out all of North Queensland. 10. However even now, if they have been shut down they are always restarted one at a time due to the immense power requirements of start up. 11. In all but the smallest of draglines, movement is accomplished by “walking” using feet or pontoons, as caterpillar tracks place too much pressure on the ground, and have great difficulty under the immense weight of the dragline. 12. Maximum speed is only at most a few metres per minute since the feet must be repositioned for each step. 13. If travelling medium distances, (about 30-100 km), a special dragline carrier can be brought in to transport the dragline. 14. Above this distance, disassembly is generally required. 15. But mining draglines due to their reach can work a large area from one position and do not need to constantly move along the face like smaller machines.

*block-out — временное отсутствие электрического освещения

1. Subject and predicate; participle II (function); ing-form.
2. Meaning of “have”.
3. Predicate.
4. Modal verb; meaning of “it”.
5. Meaning of “like”; superlative degree.
6. Noun groups.
7. Ing-forms.
8. Subject and predicate.
9. Translation of “there is”; conditional sentence.
10. Superlative degree; gerund (function); meaning of “as”.
11. Meaning of “since”; modal verb.
12. Infinitives (function).
13. Participle II (function).
14. Subject and predicate; infinitives (function); comparative degree.

Unit 7

Grammar: Complex Sentences

**Text A**

**TUNNEL BORING MACHINES**

Part I

A tunnel boring machine (TBM) is a specially designed machine which is used to excavate tunnels with a circular cross section through a variety of soil and rock strata. That they can bore through hard rock, sand, and
almost anything in between is one of their advantages. Tunnel diameters can range from a metre (done with micro-TBMs) to almost 16 metres to date. Tunnels of less than a metre or so in diameter are typically done by horizontal directional drilling rather than TBMs.

Tunnel boring machines are used as an alternative to drilling and blasting (D&B) methods. The reason of this is that a TBM has the advantages of limiting the disturbance to the surrounding ground and producing a smooth tunnel wall. This significantly reduces the cost of lining the tunnel, and makes TBM suitable to use in heavily urbanized areas. The major disadvantage is that TBMs are expensive to construct, difficult to transport and require significant infrastructure. The biggest is built by Herrenknecht AG of Schwanau, Germany to dig the 57 km Gotthard Base Tunnel. It has a diameter of 9.58 meters.

Tunnel boring machines have one or two large metal cylinders (shields) mounted on a trailing support mechanism. The front of the shield has a rotating cutting wheel. Following the cutting wheel there is a chamber where the excavated material (sand, rock, or any soil mix) is either mixed with water to make a slurry or left as it is. A system to remove the excavated material completes the tunnel boring machine.

In basic terms, the TBMs work like an earthworm with cycles of digging forward and dragging the rear end afterwards. A series of hydraulic systems pushes the TBM forward (excavating the soil) while the rear end of it is braced against the tunnel wall. When the TBM head has excavated at its maximum length (this depends on many variables including TBM type, soil type, etc) the front end of the TBM is braced against tunnel wall and the rear end is pulled forward. These cycles continue until the complete tunnel has been excavated.

Part II

Behind the shield, inside the finished part of the tunnel, several support mechanisms which are part of the TBM are located: dirt removal, slurry pipelines if they are applicable, control rooms, and rails for transport of the precast segments. The cutting wheel will typically rotate at 1 to 10 rpm (depending on the size and stratum), cutting the rock face into chips or excavating soil (muck). Depending on the type of TBM, the muck will fall onto a conveyor belt system and be carried out of the tunnel, or be mixed with slurry and pumped back to the tunnel entrance. Depending on rock strata and tunnel requirements, the tunnel may be cased, lined, or left unlined. This may be done by bringing in precast concrete sections that are jacked into place as the TBM moves forward, by assembling concrete forms, or in some hard rock strata, leaving the tunnel unlined and relying on the surrounding rock to handle and distribute the load.

While the use of a TBM eliminates the need for large numbers of workers at increased pressure, a caisson system is sometimes formed at the cutting head. Workers entering this space for inspection, maintenance and repair need to be medically “fit to dive” and trained in the operation of the locks.

Modern TBMs typically have an integrated shield. What type of TBM, a single or double shielded, will be chosen depends on the type of rock strata and the excavation speed required. Double shielded TBMs are normally used in unstable rock strata, or where a high rate of advancement is required. Single shielded TBMs, which are less expensive, are more suitable to hard rock strata.

In urban tunneling it is required that the ground surface should be undisturbed. This means that ground settling must be avoided. The normal method of doing this is to maintain the soil pressures during and after the tunnel construction. There is some difficulty in doing so, particularly in varied rock strata (e.g., boring through a region where the upper portion of the tunnel face is wet sand and the lower portion is hard rock).

TBMs with positive face control are used in such situations. There are three common types: Earth pressure balance (EPB), Bentonite slurry (BS), and compressed air (CA). The compressed air method is the oldest, although it is falling out of application due to the difficult working conditions it imposes. Both types (EPB and BS) are clearly preferred over open face methods in urban environments as they offer far superior ground control.

Active Vocabulary:

<table>
<thead>
<tr>
<th>Word</th>
<th>Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>drill</td>
<td>– бурить, сверлить</td>
</tr>
<tr>
<td>blast</td>
<td>– взрыв; взрывать</td>
</tr>
<tr>
<td>disturbance</td>
<td>– нарушение, повреждение</td>
</tr>
<tr>
<td>line</td>
<td>– выложить, облицевать</td>
</tr>
<tr>
<td>shield</td>
<td>– щит, экран</td>
</tr>
</tbody>
</table>
Exercise 1. Answer the following questions:
1. What materials can TBMs bore through?
2. Why are the TBMs used as an alternative to drilling and blasting methods?
3. What main components does a TBM have?
4. What cycles does the TBM’s work consist of?
5. How may the tunnel be used?
6. What requirements should be met in urban tunneling?
7. Why are EPB and BS types preferred in urban environment?

Exercise 2. Read Text A. Analyze the italicized subordinate clauses, define their types and the forms of their predicates.

Exercise 3. Translate the following sentences paying attention to attributive clauses:

a) without a conjunction:
1. A system the excavated material is removed with completes the TBM.
2. The purpose the counterweight is used for is to balance the load.
3. The speed the cutting wheel rotates with depends on the size.
4. The air the piston compresses is heated to the point of ignition;

b) with different meanings of “which”:
1. The carriage is the component to which the forks are mounted.
2. To put the load on high places requires a crane, which is not always practical or time-efficient.
3. Most telehandlers utilize a computer which uses sensors to monitor the vehicle.
4. Some machines are equipped with outriggers, which extend the lifting capability.
5. The operator is able to “steer” the load, which can be useful.
6. The house is able to rotate without limit due to a hydraulic distribution valve which supplies oil to the undercarriage components.
7. The weight is raised, which may involve the use of hydraulics.

Exercise 4. Translate Text B without a dictionary:

Text B

TBMs INVENTION
The first successful tunneling shield was developed by Sir Marc Isambard Brunel to excavate the Thames Tunnel in 1825. However, this was only the invention of the shield concept and did not involve the construction of a complete tunnel boring machine, the digging still having to be accomplished by the then standard excavation methods. The very first boring machine ever reported to have been built was Henri-Joseph Maus’ Mountain Slicer. Commissioned by the King of Sardinia in 1845 to dig the Frejus Rail Tunnel between France and Italy through the Alps, Maus had it built in 1846 in an arms factory near Turin. It basically consisted of more than 100 percussion drills mounted in the front of a locomotive-sized machine, mechanically power-driven from the entrance of the tunnel. Unfortunately, the Revolutions of 1848 affected the financing of the project and the tunnel was not completed until 10 years later, by using also innovative but rather less expensive methods such as pneumatic drills.

In the United States, the first boring machine to have been built was used in 1853 during the construction of the Hoosac Tunnel. Made of cast iron, it was known as Wilson’s Patented Stone-Cutting Machine, after its inventor Charles Wilson. It drilled 10 feet into the rock before breaking
down. The tunnel was eventually completed more than 20 years later, and as with the Frejus Rail Tunnel, by using less ambitious methods. In the early 1950s, F.K. Mitry won a diversion dam contract for the Oahe Dam in Pierre, South Dakota, and consulted with James S. Robbins to dig through what was the most difficult shale to excavate at that time, the Pierre Shale. Robbins built a machine that was able to cut 160 feet in 24 hours in the shale, which was ten times faster than any other digging speed at that time.

The breakthrough that made tunnel boring machines efficient and reliable was the invention of the rotating head, conceptually based on the same principle as the percussion drill head of the Mountain Slicer of Henri-Joseph Maus. But its efficiency was improved by reducing the number of grinding elements while making them to spin as a whole against the soil front. Initially, Robbins’ tunnel boring machine used strong spikes rotating in a circular motion to dig out of the excavation front, but he quickly discovered that these spikes, no matter how strong they were, had to be changed frequently as they broke or tore off. By replacing these grinding spikes with longer lasting cutting wheels this problem was significantly reduced. Since then, all successful modern tunnel boring machines have rotating grinding heads with cutting wheels.

Notes:
- concept – идея
- percussion drill – ударный бур
- diversion dam – отводная плотина
- shale – сланец, сланцевая глина

Unit 8

Grammar: Functions of “that” and “one”

Text A

PILE DRIVER

Part I

A pile driver is a mechanical device that is used to drive piles into soil to provide foundation support for buildings or other structures. That term is also used in reference to members of the construction crew that work with pile driving rigs.

One traditional type of pile driver includes a heavy weight placed between guides so that it is able to freely slide up and down in a single line. It is placed upon a pile. The weight is raised, which may involve the use of hydraulics, steam, diesel, or manual labour. 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.

Ancient pile driving equipment used manual or animal labour to lift heavy weights, usually by means of pulleys, to drop the weight onto the end of the pile. Modern pile driving equipment uses various methods to raise the weight and guide the pile.

There are several types of pile driving equipment.

Diesel hammer. A modern diesel pile hammer is a very large two-stroke diesel engine. The weight is the piston, and the apparatus which connects to the top of the pile is the cylinder. Piledriving is started by having the weight raised by auxiliary means – usually a cable from the crane holding the pile driver – which draws air into the cylinder. The weight is dropped, using a quick-release. The weight of the piston compresses the air, heating it to the ignition point of diesel fuel. Diesel fuel is added/injected into the cylinder. The mixture ignites, transferring the energy of the falling weight to the pile head, and driving the weight back up. The rising weight draws in more fuel-air mixture, and the cycle starts over until the fuel runs out or is stopped by the pile crew.

Hydraulic hammer. A hydraulic hammer is a modern type of piling hammer used in place of diesel and air hammers for driving steel pipe, precast concrete, and timber piles. Hydraulic hammers are more environmentally acceptable than the older, less efficient ones as they generate less noise and pollutants.

Part II

Hydraulic Press-in. Specialty equipment which installs piles using hydraulic rams to press piles into the ground. This system is preferred where vibration is a concern. There are press attachments that can adapt to conventional pile driving rigs to press two pairs of sheet piles at a time. Additional types of press equipment sit on top of existing sheet piles and grip onto previously driven piles. This system allows for greater press-in and extraction force to be used since more reaction force is developed. The reaction based machines operate at only 69dB at 23ft
allowing for installation and extraction of piles in very close proximity to noise and vibration sensitive areas where traditional methods may threaten the stability of existing structures.

Such equipment and methods are specified into portions of the internal drainage system in the New Orleans area after Hurricane Katrina as well as many projects around the world where noise, vibrations and limited access are a concern during the engineering, design and construction phases of the project.

**Vibratory Pile Driver/Extractor.** Vibratory pile hammers contain a system of counter-rotating eccentric weights, powered by hydraulic motors, and designed in such a way that horizontal vibrations cancel out, while vertical vibrations are transmitted into the pile. The pile driving machine is lifted and positioned over the pile by the power of an excavator or that of a crane, and is fastened to the pile by a clamp and/or bolts. Vibratory hammers can either drive in or extract a pile; extraction is commonly used to recover steel “H” piles used in temporary foundation shoring*. Hydraulic fluid is typically supplied to the driver by a diesel engine powered pump mounted in a trailer or van and connected to the driver head through a set of long hoses. When the pile driver is connected to an excavator, it is powered by the excavator’s own diesel engine. Vibratory pile drivers are often chosen to reduce noise, as when the construction is very close to residence or office buildings, or when there is not enough vertical clearance above the foundation to permit use of a conventional pile hammer (for example when fitting additional piles to a bridge column or abutment footing). Hammers are available with several different vibration rates, ranging from about 1200 vibrations per minute to about 2400 vpm; the vibration rate chosen is influenced by soil conditions at the site and other factors such as power requirements and purchase price of the equipment.

* shoring – установка временных (монтажных) опорных стоек

**Active Vocabulary:**
- pile driver – свайный копер
- crew – бригада
- rig – буровая установка, копер
- pile driving rig – сваебойная установка, копер
- guide – направляющее приспособление
- hammer – молот
- manual – ручной; руководство
- piston – поршень
- auxiliary – вспомогательный
- hold – захват; держать
- ignite – зажигать, воспламенять
- rise – подниматься
- run out – истощаться
- noise – шум
- pollutant – загрязнитель
- extract – вытаскивать, извлекать
- fasten – прикреплять
- hose – рукав, шланг
- clearance – зазор, клиренс

**Exercise 1. Answer the following questions:**
1. What do piles provide?
2. How does a pile driver work?
3. What is the weight in a diesel pile hammer?
4. Why are hydraulic hammers more environmentally friendly?
5. Where are hydraulic press-in systems preferred?
6. When are vibratory pile drivers the most suitable?

**Exercise 2. Read Text A and analyze the functions of the underlined words.**

**Exercise 3. Translate the following sentences paying attention to the functions of “one’ and “that”:**
1. The cab is the area that contains a seat for the operator.
2. The truck is powered by the energy of the internal combustion engines or by that of electric motors.
3. The mast is operated by one or two hydraulic cylinders.
4. That type of attachment will speed the loading.
5. The L-2350 uses a diesel electric propulsion system similar to that used in a locomotive.
6. The front loader’s bucket capacity is much bigger than that of a backhoe.
7. One can’t classify loaders as earthmoving machines.
8. Excavators are produced in a wide variety of sizes. The smaller ones are called compact excavators.
9. That vibratory hammers can either drive in or extract a pile make them more widely used.
10. It is known that hydraulic hammers generate less noise.

Exercise 4. Translate Text B without a dictionary:

Text B

FROM A MANUAL ON PILE DRIVING HAMMERS
The initial start up of the hammer requires the piston (ram) to be raised to a point where the trip automatically releases the piston, allowing it to fall by gravity. As the piston falls, it activates the fuel pump, which discharges a metered amount of fuel into the ball pan of the impact block. The falling piston also blocks the exhaust ports, and compression of fuel trapped in the cylinder begins. The compressed air exerts a pre-load force (approx. 44,000 lb or 20,000 kg) to hold the impact block firmly against the drive cap and pile. At the bottom of the compression stroke, the piston strikes the impact block, atomizing the fuel and starting the pile on its downward movement. In the instant after the piston strikes, the atomized fuel ignites, and the resulting explosion exerts an even greater force on the already moving pile, driving it further into the ground. The reaction of the explosion rebounding from the resistance of the pile drives the piston upward. As the piston rises, the exhaust ports open, releasing the gases and force of the explosion into the atmosphere. After the piston stops its upward movement, it again falls by gravity to start another cycle.

Notes:

pan — лоток, поддон
exert — оказывать, вызывать
impact — удар
rebounding — отскок, отдача

ЛЕКСИЧЕСКИЙ МИНИМУМ (1–3 СЕМЕСТР)

A
acceptance — принятие
accessories — принадлежности
accomplish — совершать, выполнять
account — счет, расчет
achieve — достигать, добиваться
actuate — приводить в действие
adapt — адаптировать, приспосабливать
adjust — приспосабливать, регулировать
advanced — передовой, развитый
advantage — преимущество
aisle — проход
align — выравнивать, регулировать
alter — изменять, переделывать
amount — количество, сумма
appearance — появление; внешний вид
appliance — приспособление, прибор
apply — применять, прикладывать
approximate — приблизительный; приближаться
arm — рукоятка, стрела
arrangement — устройство
articulated — шарнирный
assembly — агрегат, сборка
assist — помогать
attach — крепить
auger — сверло, бурав
auxiliary — вспомогательный
available — доступный, имеющийся в распоряжении
avoid — избегать
axle — ось

B
backfill — засыпка (траншей)
backhoe — экскаватор, обратная лопата
bale — кипа, тюк
barrel — бочка
beam — балка
bearing — подшипник
bed – дно
belt – ремень
blade – лезвие, нож
blast – взрыв; взрывать
boiler – котел
boom – стрела, укосина
bore – сверлить, бурить
brace – скоба, связь; связывать
braking power – сила торможения
break – ломать, разрушать
bucket – ковш
bushing – втулка, вкладыш
C
cableway – канатная дорога
camshaft – распределительный вал
cantilever crane – кран-консоль, кран-укосина
capacity – емкость, производительность, мощность
carriage – шасси, рама, несущее устройство
carry – нести
case – кожух; обшивать, покрывать
cast iron – чугун
caterpillar – гусеница, гусеничный ход
cause – быть причиной, вызывать
cell – элемент, батарея
chain – цепь
chamber – камера
chassis – шасси, рама, ходовая часть
circular – круглый, круговой
claim – утверждать, заявлять, требовать
clamp – зажим, хомут, скоба
clam-shell – грейфер
clearance – зазор, клиренс
cutch – сцепление
clutch – сцепление
compactor – уплотнитель
compartment – отделение
complete – завершать; полный, законченный
compression stroke – ход сжатия
comprise – включать, содержать
concrete – бетон
condition – условие, состояние
conjunction – соединение, связь
conservation – сохранение
consideration – рассмотрение, соображение
construction – строительство
consumption – потребление
contain – содержать
continuous – непрерывный
contractor – подрядчик
conventional – обычный, традиционный
convert – превращать
convertible – обратимый, изменяемый
crane – бригада
cross section – поперечное сечение
curve – кривая
cut – резать, резать
D
damage – вред, ущерб
decrease – уменьшать
deliver – вырабатывать, доставлять
demolition – разрушение, снос
depend on – зависеть от
deposit – класть
derrick – дerrick-кран
design – проект, конструкция
determine – определять
develop – развивать, разрабатывать
device – устройство, прибор
dig – копать
dimension – размер
dipper – ковш
distribute – распределять
disturbance – нарушение, повреждение
drag – тянуть, тащить
dragline – драглайн, скребковый экскаватор
draw – тащить, тянуть
drill – бурить, сверлить
drive – привод, передача
drop – падать, ронять
dump truck – самосвал
dumpcar – опрокидывающаяся тележка или вагонетка, думпкар
durable – прочный, долговечный
E
earthwork – земляные работы
draw – тащить, тянуть
drop – падать, ронять
drive – привод, передача
dump truck – самосвал
dumpcar – опрокидывающаяся тележка или вагонетка, думпкар
durable – прочный, долговечный
facility – оборудование, приспособление
feature – особенность, характерная черта
feed – питать, снабжать
final drive – главная передача
fit – совпадать, соответствовать, устанавливать
fix – укреплять, устанавливать
flat – плоский
fluid – жидкость
flywheel – маховое колесо
force – сила
forklift truck – погрузчик с вилочным захватом
forward – вперед
frame – рама
friction – трение
front loader – фронтальный погрузчик
fuel – топливо
G
gantry crane – порtalный или эстакадный кран, козловой кран
gear – шестерня, передаточный механизм, привод
generate – производить, генерировать
grab – захват; захватывать
grade – выравнивать, профилировать
grapple – захват
grip – тиски, зажим, захват; сжимать
groove – желобок, паз
ground clearance – клиренс
guard – предохранительное приспособление
guide – направляющее приспособление
H
hammer – молот
handle – обращаться, грузить, транспортировать
heat – теплота
heavy – тяжелый
hindrance – помеха, препятствие
hinge – прикреплять на петле; висеть, вращаться на петле
hoist – подъемник
hold – захват; держать
hopper – воронка, бункер
hose – рукав, шланг
house – корпус; вмещать, размещать
I
idler – направляющий шкив, ролик
ignite – зажигать, воспламенять
impart – давать, придавать
impose – налагать
improve – улучшать
include – включать
increase – увеличивать, возрастать
insert – вставлять
install – устанавливать
intake stroke – ход впуска
integrate – составлять целое, объединять
intend – намереваться, предназначать
intermediate – промежуточный
intermittent – периодический, циклический
internal-combustion engine – двигатель внутреннего сгорания
invent – изобретать
involve – включать, вовлекать
item – предмет, вопрос
J
jack – домкрат
jaw – захват, зажим
jib crane – кран-укосина
join – соединять
joint – место соединения, соединение
L
layer – слой
level – уровень
lever – рычаг
lift – поднимать
line – выложить, облицевать
link – звено, связь, соединение; соединять
load – груз; грузить
loop – петля
loose – рыхлый; освобождать
loss – потеря
luffing – изменение вылета стрелы
M
maintenance – эксплуатация, уход, текущий ремонт
manoeuvrable – маневренный
manual – ручной; руководство
mast – мачта
match – подходить, соответствовать
means – средство
meet the demands – отвечать требованиям
mesh – зацепление, зацеплять
mining – горное дело, разработка недр
mobile – подвижный, перемещаемый
monorail telpher – монорельсовый тельфер
motion – движение
mount – монтировать, устанавливать
movement – движение
N
noise – шум
O
obstacle – препятствие, помеха
off-road – внедорожный
offset – ответвление, отвод
operation – действие, работа
opposite – противоположный
option – выбор
oscillation – качание, колебание
outrigger – аутригер, выносная опора
overhead crane – мостовой кран
P
pallet – поддон
palletize – пакетировать
pave – мостить
pavement – тротуар, мощеная дорога
permanent – постоянный
permit – позволять, разрешать
pile – куча, груда
pile driver – свайный копер
pile driving rig – свеебойная установка, копер
pinion – шестерня, меньшее зубчатое колесо пары
pivot – точка вращения, ось; вращаться
plate – плита
plow – плуг
pneumatic – пневматический
point – точка
pole – столб, шест
pollutant – загрязнитель
position – положение, место
power – сила, мощность
power installation – силовая установка
power shovel – экскаватор
power stroke – рабочий ход
precast – предварительно отлитый, сборный
precise – точный
prefer – предпочитать
pressure – давление
prevent – предотвращать
prime mover – пусковой (основной) двигатель
prong – зубец, вилы
propulsion – продвижение
protection – защита
protrude – выдвигать
provide – обеспечивать, снабжать
provision – снабжение, обеспечение
pull – тянуть, тащить
pulley – шкив
pump – насос
purpose – цель, назначение
push – толкать
Q
quarry – карьер
quay crane – портальный кран
quiet – тихий
R
rack – перемещать при помощи зубчатой рейки
rail – рельс
raise – поднимать
ram – подъемник, силовой цилиндр
range – ряд, диапазон; колебаться в пределах
rate – норма, скорость
ratio – отношение
reach – достигать; радиус действия
rear – задняя сторона
recovery – восстановление
reduce – уменьшать
refer – иметь отношение; относиться
release – освобождать, отпускать
reliable – надежный
remain – оставаться
remote control – дистанционный контроль
repair – ремонт
replace – заменять
require – требовать
research – исследование
resistance – сопротивление
responsible – ответственный
rest – опора, подставка, стойка
restrict – ограничивать
reverse – задний или обратный ход
revolution – круговое вращение, полный оборот
revolving shovel – ковш, вращающаяся лопата
rig – буровая установка, копер
rigger – такелажник
ripper – рыхлитель, риппер
rise – подниматься
roll – ролик, каток
roller – ролик, каток
rotate – вращаться
rubber – резина
run out – истощаться
running gear – ходовая часть
S
safety – безопасность
save – экономить
schedule – расписание, график, режим
scoop – ковш, вычерпывать
scraper – скрепер
screw – винт
seat – сидение
selection – выбор
self-dumping – самоопрокидывающийся
self-powered – самоходный
self-propelled – самоходный
sequence – последовательность, следование
service – служба, обслуживание; обслуживать
set up – настраивать, устанавливать
shaft – вал, ось
shape – форма
sharp – острый
sheave – шкив, блок
shield – щит, экран
shift – сдвиг; сдвинуть
shove – толкать
shovel – лопата
side – сторона, бок; боковой
significant – важный
single – один; одиночный
site – участок
size – размер
skid – направляющая рейка (рельс)
skilled – квалифицированный
slew – поворачивать(-ся), вращать(-ся)
slide – скольжить; скольжение
slip – скользить; скольжение
slurry – жидкая глина
soil – почва, земля
solid – твердый, сплошной, целый
solution – решение
source – источник
space – пространство, место
specific weight – удельный вес
specimen – образец, экземпляр
speed – скорость
spill – рассыпать
spoil – земля, вынутая при земляных работах
spring – пружина, рессора
sprocket – зубчатое колесо; звездочка
squeeze – сжимать, сдавливать
stability – стабильность, устойчивость
stable – стабильный, устойчивый
stack – складывать, складировать
staple – скоба, крюк
steam engine – паровой двигатель
steel – сталь
steer – управлять
stiffness – жесткость
stockpile – штабель; накапливать, штабелировать
store – запас; хранить
straight – прямой; прямо
strength – прочность, сила
strip – полоса; снимать (слой)
stroke – ход поршня
strut – стойка, подпорка
suit – подходить, соответствовать
supply – снабжать, доставлять
support – поддерживать
surface – поверхность
suspension – подвеска
swing – качаться, колебаться
switch – переключатель; переключать
swivel – вращаться, поворачиваться
T
tension – напряжение, натяжение
term – термин
throw – бросать
tilt – наклонять, опрокидывать
timing belt – ремень привода газораспределительного механизма
tip – наклонять(-ся), опрокидывать(-ся)
tool – инструмент
toothed – зубчатый
torque – крутящий момент, скручивающее усилие
tow – тянуть, буксировать
tower crane – башенный кран
track – гусеница (трактора)
tracked vehicle – гусеничное транспортное средство
trackless – безрельсовый
traction – тяга
trailer – прицеп
transfer – переносить, передавать
transform – преобразовывать, трансформировать
transmit – передавать
travel – движение, двигаться	
trench – ров, траншея
trolley – тележка, вагонетка, контактный ролик
truck – грузовик
truss – ферма, связь
turntable – поворотный круг
twist – крутить, скручивать
tyre – шина

U
undercarriage – ходовая часть, шасси
utilize – использовать

V
value – значение, величина
valve – клапан
variety – разнообразие
vehicle – транспортное средство
versatility – многосторонность, универсальность
via – через
volume – объем

W
walking gear – шагающее ходовое оборудование
warehouse – склад
waste – отходы, пустая порода
wear – износ; изнашиваться
wedge – клин
weigh – весить
weight – вес
weld – сваривать
wheel – колесо
winch – лебедь, ворот
wind – наматывать, поднимать при помощи лебедки
wire rope – проволочный канат
wood – древесина
АНГЛИЙСКИЙ ЯЗЫК

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