

АНГЛИЙСКИЙ ЯЗЫК

**Учебное пособие по обучению научно-техническому
переводу**

**(для студентов факультета технологии и техники
лесной промышленности)**

МИНСК БГТУ 2005

Учреждение образования
“БЕЛОРУССКИЙ ГОСУДАРСТВЕННЫЙ
ТЕХНОЛОГИЧЕСКИЙ УНИВЕРСИТЕТ”

АНГЛИЙСКИЙ ЯЗЫК

**Учебное пособие по обучению научно-техническому
переводу**

**(для студентов факультета технологии и техники
лесной промышленности)**

МИНСК 2005

УДК 802.0-07-085
ББК 81.261.7 Англ-923
А 64

Рассмотрено и рекомендовано к изданию редакционно-издательским советом университета.

Составитель:

преподаватель *О.А. Буяк*

Научный редактор доцент кафедры иностранных языков БГТУ

А.В. Посох

Рецензенты:

доктор. филол. наук, профессор кафедры лексикологии английского языка МГЛУ *А.П.*

Клименко;

канд. филол. наук, ст. преподаватель кафедры иностранных языков ИГУ Академии

Управления при Президенте Республики Беларусь *Л.В. Вертаева*

Английский язык: Учебное пособие по обучению научно-
А 64 техническому переводу (для студентов факультета техно-
логии и техники лесной промышленности) / Сост. О.А. Буяк;
Науч. ред. А.В. Посох. – Мн.: БГТУ, 2005.

ISBN

В данном пособии рассматриваются основные трудности при переводе английской и американской технической литературы по специальностям, связанным с лесной промышленностью. Цель данного пособия – обучить студентов основным навыкам анализа и перевода текстов научно-технического профиля. В пособии содержится теоретический и практический материал как для аудиторной работы, так и для самостоятельной подготовки студентов, бакалавров, магистрантов и аспирантов.

Пособие может быть также полезным для лиц желающих самостоятельно совершенствовать свои знания английского языка и освоить теорию и технику перевода научно-технических текстов.

УДК 802.0-07-085

ББК 81.261.7 Англ-923

© Учреждение образования
“Белорусский государственный
технологический университет”, 2005

ВВЕДЕНИЕ

Научно-технический прогресс и интенсивное развитие международного сотрудничества неизбежно приводит к увеличению обмена информацией во всех областях науки и техники. В связи с этим умение читать и переводить профессионально ориентированную литературу становится чрезвычайно важным для современного инженера.

Одной из первостепенных целей обучения иностранному языку в техническом вузе является развитие и совершенствование навыков научно-технического перевода по специальности. Для достижения этой цели наряду с общими учебниками необходимы специализированные словари и пособия, которые отражают особенности языка научно-технической литературы.

Настоящее пособие предназначено для обучения научно-техническому переводу студентов специальностей техники и технологии лесной промышленности высших технических учебных заведений. Анализ пособий и учебников, посвященных проблемам перевода, показывает, что такой учебно-методической литературы имеется недостаточное количество, а по данным специальностям она практически отсутствует.

Пособие предназначено для студентов II курса специальностей «Лесоинженерное дело», «Технология деревообрабатывающих производств», «Машины и оборудование лесного комплекса», «Энергоэффективные технологии и энергетический менеджмент» и рассчитано на 120 аудиторных часов. Преподаватель самостоятельно планирует свою работу с учетом учебного плана и рабочей программы. Задача пособия – освоение основных практических навыков обработки текста при переводе с английского языка на русский. Материал пособия может быть использован на аудиторных занятиях, для самостоятельной работы студентов, равно как и на занятиях с магистрантами и аспирантами.

Пособие состоит из пяти частей и приложения. Каждая часть посвящена отдельным теоретическим или практическим аспектам перевода.

В первой части освещаются некоторые особенности языка научно-технических материалов и характерные черты данного функционального стиля. Особое внимание при этом уделяется описанию терминов, которые являются наиболее часто используемыми лексическими единицами. Рассматриваются также другие лексико-грамматические особенности научно-технической литературы, которые необходимо учитывать при переводе.

Во второй части изложены основные приемы работы со словарем, что является необходимым условием для успешного перевода. Теоретические положения сопровождаются небольшими упражнениями для отработки навыков поиска слов в словаре.

Часть III «Основной курс» состоит из 10 разделов, в каждом из которых рассматриваются отдельные аспекты перевода. Грамматические и лексические упражнения содержат как общеупотребительную, так и научную лексику и направлены на развитие навыков перевода отдельных языковых явлений и конструкций, которые вызывают наибольшие затруднения при переводе. В области грамматики это, прежде всего, страдательный залог, инфинитив, герундий, причастие, предложные и союзные обороты и др. В области лексики особое внимание отводится переводу многокомпонентных терминов, интернациональных слов, неологизмов и сокращений.

В конце каждого раздела приводятся тексты для письменного перевода, расположенные согласно следующему принципу: под буквой А находятся тексты для студентов специальности «Лесоинженерное дело», В – «Технология деревообрабатывающих производств», С – «Машины и оборудование лесного комплекса», Д – «Энергоэффективные технологии и энергетический менеджмент». Работая с пособием, преподавателю необходимо руководствоваться данным принципом при выборе текста для студентов той или иной специальности.

В конце основного курса приводятся дополнительные тексты, которые могут быть использованы как для перевода под руководством преподавателя, так и для самостоятельной работы с последующим общим обсуждением результатов. Тексты в основном подобраны из оригинальной английской и американской научно-технической литературы и в значительной мере отражают современное состояние английского языка данного стиля.

В четвертой части рассматриваются грамматические конструкции английского языка, которые наиболее характерны для языка научно-технической литературы и требуют особого внимания при переводе. Излагаемая теория проиллюстрирована достаточным количеством примеров, что способствует более полному усвоению материала.

Часть IV «Лексические основы перевода» освещает вопросы перевода терминологии, неологизмов, сокращений, интернациональных слов и др.

Перед тем, как выполнять грамматические и лексические упражнения каждого из 10 разделов основного курса

рекомендуется ознакомиться с основными теоретическими аспектами, изложенными в четвертой и пятой частях.

В приложении приводится список-минимум сокращений, а также списки слов-«ложных друзей» переводчика и слов-паранонимов.

Рассмотренные в данном пособии переводческие проблемы и способы их практического решения, разумеется, не исчерпывают всего многообразия изложений при переводе и поэтому оно не может претендовать на полноту изложения материала и на однозначность рекомендаций, тем более, что перевод допускает много вариантов адекватной передачи мысли оригинала. Однако надеемся, что оно будет полезным при обучении студентов переводу литературы по специальности и окажет преподавателю посильную помощь в организации учебного процесса.

I. ОСОБЕННОСТИ ЯЗЫКА НАУЧНО-ТЕХНИЧЕСКИХ МАТЕРИАЛОВ

Характерными особенностями научно-технического стиля являются его информативность, логичность, точность и объективность и вытекающие из этих особенностей ясность и понятность. В области лексики данные особенности проявляются, прежде всего, в использовании научно-технической терминологии и так называемой специальной лексики. Под термином обычно понимается слово (или группа слов), имеющие в пределах данной отрасли или специализации конкретный и единственный смысл, исключающий всякую возможность иного, отличающегося от предусмотренного автором понимания или толкования. Так, например, приведенные ниже слова и группы слов являются терминами:

cost – затраты;

stock exchange – товарная биржа;

computer-aided design – автоматизированное проектирование.

В качестве терминов могут использоваться как слова, употребляемые почти исключительно в рамках данного стиля, так и специальные значения общеупотребительных слов. Термины должны обеспечивать четкое и точное указание на реальные объекты и явления, устанавливать однозначное понимание специалистами передаваемой информации. Поэтому к этому типу слов предъявляются особые требования. Прежде всего, термин должен быть точным, т.е. иметь строго определенное значение. Он также должен быть однозначным и в этом смысле независимым от контекста и иметь свое точное значение, указанное его определением. Необходимо, чтобы каждому понятию соответствовал лишь один термин, т.е. чтобы не было терминов-синонимов с совпадающими значениями. И, наконец, термин должен быть сугубо объективным наименованием, лишенным каких-либо побочных смыслов. Решающим фактором при переводе терминов является контекст.

Особое внимание при переводе научно-технических текстов также следует уделить переводу терминов-неологизмов, так как они в большинстве случаев отсутствуют в словарях. Особенно много неологизмов среди названий изделий выпускаемых в настоящее время различными фирмами. Научно-техническая литература, как правило, изобилует сокращениями и аббревиатурами, что также представляет определенные трудности при переводе. Такие сокращения являются общепринятыми и официальными и их перевод должен быть адекватным. Например,

a.m. = *ante meridiem* – до полудня, *a.c.* = *alternating current* – переменный ток.

Английские научно-технические материалы обнаруживают и целый ряд грамматических особенностей. Необходимо отметить такую особенность употребления глаголов в научно-техническом стиле английского языка, как значительное преобладание пассивных форм и форм простого настоящего времени, что, несомненно, связано с основными характеристиками и целями научного изложения. Особое внимание заслуживает широко распространенное в специальных текстах использование переходных глаголов в непереходной форме с пассивным значением:

These filters ***adapt*** easily to automatic processing of many materials.

The steel ***forges*** well.

Для научно-технического стиля характерна, например, также замена определительных придаточных предложений прилагательными в постпозиции (особенно суффиксами *-able*, *-ive* и др.): *the materials available; excellent properties never before attainable; all factors important in the evaluation, etc.* Та же цель может достигаться и использованием в функции определения форм инфинитива: *the properties to be expected; the temperature to be obtained; the product to be cooled, etc.*

Можно также отметить многочисленные случаи опущения в научно-технических материалах артикля, особенно определенного, там, где в текстах другого типа его употребление считается абсолютно обязательным: *General view is that... First uranium mine in the region was...*

В связи с отмечавшейся выше последовательностью и доказательностью научного изложения наблюдается также повышенное использование причинно-следственных союзов и логических связей типа *since; therefore; it follows that; so; thus; it implies; involves; leads to; results in, etc.*

Отмеченные лексико-грамматические особенности научно-технических материалов оказывают непосредственное влияние на коммуникативный характер таких материалов, который должен быть воспроизведен при переводе.

II. КАК РАБОТАТЬ СО СЛОВАРЕМ

Умение четко и быстро работать со словарем является одним из важных элементов работы переводчика. Ниже излагаются основные сведения о технике работы со словарем.

Расположение слов в словаре

Все слова в словаре расположены в порядке английского алфавита; для справок английский алфавит приводится в начале словаря.

Для того чтобы успешно пользоваться словарем и быстро находить нужное слово, надо твердо знать английский алфавит в порядке расположения его букв. Далее следует учесть, что слова, начинающиеся на одну букву, расположены в словаре не бессистемно, а в порядке последующих букв. Поэтому, например, слово *white* расположено в словаре до слова *write*, т. к. вторая буква первого слова *-h* стоит в алфавите впереди второй буквы слова *write -r*. Этот же принцип сохраняется и в отношении всех последующих букв каждого слова, что облегчает отыскивание нужного слова.

Упражнение

Определите какое слово из двух расположено в словаре раньше:

pet – dove; lime – fuse; gamble – pant; dime – light; fusil – gambit; price – picture; create – cable.

Как отыскивать слова

При отыскивании слов нужно учесть, что словарь дает слова в исходных (основных) формах, тогда как в тексте они встречаются большей частью в производных формах. Следовательно, прежде чем обращаться к словарю, необходимо восстановить исходную форму слова.

Упражнение

Установив исходную форму, найдите значение в словаре, а затем дайте перевод приведенных ниже слов:

cherries, flagless, steepest, unwatered, carried, carelessly, hoping, redrafted, hopping.

Часто глагол меняет свое значение под влиянием стоящего за ним послелога (предлога или наречия), например: *to carry* – нести; *to carry on* – продолжать; *to carry out* – выполнять.

Измененные значения данного глагола приводятся англо-русским словарем с указанием соответствующего послелога в специальной рубрике, имеющей заголовок: *с предлог. и нареч.*

Например, для глагола *to write* даются следующие значения: *write down* – записывать; *write for* – выписывать; *write off* – списывать со счета; *write out* – переписывать; *write up* – дописывать.

Как видно из этого примера, послелоги располагаются также в алфавитном порядке.

Упражнение

Найдите в словаре значения следующих сочетаний:

to put about; to put on; to take down; to take up; to put back; to put upon; to take off; to take upon.

Омографы, т. е. слова тождественные по написанию, но различные по смыслу даются в словаре отдельно под римскими цифрами как различные слова, например:

lead I [led] свинец

lead II [li: d] вести

Упражнение

Определите по словарю, сколько имеется различных слов с написанием:

mull, butt, fell, pile, port, flag, last, sound, bar.

Многие слова в английском языке употребляются в функциях различных частей речи. Словарь дает к каждому слову ряд значений, причем разделение их по частям речи помечается арабскими цифрами и условными обозначениями, например, для слова *iron* словарь указывает:

1. *n* 1) железо; 2) черный металл; 3) железное изделие;

4.) утюг; 5) оковы; 6) препарат железа;

2. *a* железный, сильный, крепкий;

3. *v* 1) утюжить, гладить; 2) заковывать в кандалы;

3) покрывать железом.

Мы видим, таким образом, что слово *iron* употребляется в функциях трех частей речи: как существительное, как прилагательное и как глагол, на что указывают соответствующие условные обозначения: *n*, *a*, *v*.

При переводе слова нужно внимательно просмотреть все приведенные значения для данной части речи и выбрать из них наиболее подходящее, исходя из контекста, а отнюдь не останавливаться на первом попавшемся значении.

Упражнения

1. Определите, в функциях каких частей речи употребляются следующие слова:

box I, sock II, blow III, cable.

2. Найдите техническое значение слов:

liner, bush, form, jack, jacket, to found.

III. ОСНОВНОЙ КУРС

UNIT I

Грамматические основы перевода, упражнения.

- Конструкции страдательного залога и их перевод.
- Анализ и перевод простых предложений.

Лексические основы перевода, упражнения.

- Выбор лексического варианта.
- Перевод терминов типа «существительное + существительное».

Текст А. Felling.

Текст В. Woodworking.

Текст С. General Engine Design.

Текст D. Energy.

GRAMMAR EXERCISES

Ex. 1. *Put the verbs in brackets in necessary tense and voice.*

Translate the sentences:

1. Mini motor cars (to sell) all over the Europe. 2. Many vehicles (to drive) by an internal combustion engine. 3. They (to use) this fuel for different engines. 4. The efficiency of a new tractor (to increase) already. 5. The climate control system (to inspect) by the engineer. 6. Our mechanic just (to test) the oil filters in this vehicle. 7. A new device (to install) in the tractor recently? 8. The engineers (to manufacture) the new acoustic system last year. 9. The firm (to deliver) a new model of a lathe by the beginning of the year. 10. The engineers (to improve) the design of this machine before the plant (to begin) to produce it.

Ex. 2. *Translate the following sentences into Russian:*

1. The Leningrad metro was being constructed when the Great Patriotic War broke up. 2. Tsiolkovsky's ideas were recognized and he was given state support. 3. Radio sets are provided for in all sea going vessels. 4. The discovery of radium was followed by a number of important inventions. 5. The current is measured with the ammeter. 6. The expedition was given a very difficult task. 7. The balloon has been lost sight of. 8. This problem may be approached from different standpoints. 9. Spanish is spoken in South America. 10. His words were followed by a deep silence. 11. The question of further development of agriculture was given much attention. 12. The trajectory of a projectile is affected to a large extent by air resistance. 13. We are taught that light is a form of energy. 14. A floating body is acted upon by two sets of forces. 15. This project must be given due consideration. 16. Nuclear reactor is provided with a concrete shielding. 17. The Conference was attended by 150 delegates. 18. The speaker was

listened to attentively. 19. Have you been brought a newspaper?
20. Potatoes were brought to Europe by Columbus.

Ex. 3. *Translate the sentences paying attention to the predicates in Passive Voice:*

1. Numerous classifications have been used. 2. A more careful approach is needed. 3. Separate coefficients of viscosity are used to establish stresses. 4. Information on the volume of reservoir is required. 5. The large disagreement between the various published data is discussed. 6. This date will be insisted on. 7. The results of the experiment can be relied upon. 8. The terms were agreed upon. 9. The matter was referred to. 10. The new discovery is being much spoken about. 11. Some of the data obtained can not be relied upon, others have not been published yet. 12. The quality of the instruments used can be safely relied upon. 13. Old traditions cannot be easily done away with. 14. Certain units have been defined for special applications, e.g., the light-year and parsec in astronomy and the angstrom in physics. 15. Today we see the world in which social, industrial and political order has been greatly influenced by science. 16. The first general-purpose computer for scientific use was invented in 1949. 17. Now much is being done to create artificial intellect.

Ex. 4. *Translate the sentences, pay attention to the predicates in Passive Voice:*

1. Unless heat is provided from an external source, any evaporating water is cooler than the surrounding air. 2. It may safely be predicted that soon ordinary fuels will be to a large extent replaced by nuclear fuel in the production of electrical power. 3. Spanish is spoken both in Spain and in South America. 4. To ensure stable radio communication different radio waves are to be selected for a certain range, time, and season of the year. 5. Two bodies being placed in contact with each other, the temperature of the hot body falls while that of the cold one rises. 6. Inertia is that property of matter because of which a force must be exerted on a body in order to accelerate it. 7. It has been shown theoretically that all the elements we find in nature can be made to produce energy by nuclear reaction; this problem will be solved practically sooner or later. 8. Powder was known to the Chinese as early as the 5th century. 9. Electric energy was discovered by a Greek philosopher named Thales, about 2,500 years ago.

Ex. 5. *Analyze the sentences below, translate them into Russian:*

1. Further successes have been registered by the democratic peace-loving forces of the world. 2. The reaction of splitting the nucleus of lithium into two alpha particles under the bombardment with artificially accelerated protons was carried out by Sinelnikov and Valter in the USSR in 1932 and by Cockroft and Walton in England. 3. This

hangar houses planes and gliders. 4. The workers machine tools before heating them. 5. The flags flag in calm weather. 6. Running exercises leg muscles. 7. This hall seats about 2,000 people. 8. Many world largest ports have installed radar systems in their harbours. 9. All technical means will be perfect in future. 10. Without electronic equipment space flights would be impossible.

LEXICAL EXERCISES

Ex. 6. *Look up the italicized words in a dictionary to choose the best translation. Translate the sentences:*

A) 1. Electric *power* can easily be transferred over long-distance from the *power-plant*. 2. The important task of preserving peace lies mainly with the Great *Powers*. 3. Five to the second *power* is equal to twenty-five.

B) 1. An electromotive force is produced when a conductor cuts magnetic *lines* of force. 2. The peace proposals of our delegation were in *line* with the peaceful policy of the Russian Government. 3. The Iraqi Government took a strong *line* in its negotiations with the Western Powers. 4. I know by heart many *lines* of Pushkin's works, especially his lyric poems.

C) 1. Under the influence of heat the substance *passed* from a solid into a liquid state. 2. Our ship *passed* the Suez Canal at noon. 3. The artificial satellite appeared over Moscow at 6.50 a.m. and then quickly *passed* out of sight. 4. The Conference *passed* a resolution calling for the immediate banning of nuclear tests. 5. The student successfully *passed* all his examinations.

Ex. 7. *Translate the text below paying attention to the meaning of the verb "to get":*

How I Got the Ticket

As soon as I had got your letter in which you were asking me to get a ticket for "Hamlet," I got on horseback and went to town. Before I got there, I had to get across the river. I got wet through and I have got such a cold that I shall not be able to get rid of it in a week or so. Having got to the town I first of all got shaved and dressed and then got into the booking office to get a ticket for the play.

Unfortunately, I was not able to get the ticket that very evening; however I got to know there that I should most likely get one the next morning.

I got out and went home. As soon as I got there, I got my supper and then got to bed.

I got up at 7 o'clock in the morning, got my breakfast and then got myself dressed that I might get out in time to get the ticket.

After I have got it I got into the tram and about 10 o'clock I got home.

So I got through with your errand; I have got the desired ticket, which you may get at any time you like.

Ex. 8. Translate the following terms consisting of noun + noun:

Model: oil pressure

↓
чего? ← давление

↓
нефть

давление нефти

- | | |
|-----------------------|-----------------------|
| 1. load capacity | 8. exhaust valve |
| 2. power cylinder | 9. engine oil |
| 3. air intake | 10. disk wheel |
| 4. compression volume | 11. control pedal |
| 5. farm tractor | 12. construction work |
| 6. flyball governor | 13. assembly plant |
| 7. gear box | 14. injection system |

Text A

Felling

Felling is the first operation in logging. Primary objectives in felling may be: 1) maximum production; 2) minimum cost of machines and labour.

To fell a tree where it will do the least damage to surrounding trees and young growth is the first task of the felling crew. The fellers must see to it that the felled trees as they fall do not damage the surrounding trees.

Each tree should be felled where it can be skidded most easily. For small trees it is not very difficult. For larger trees and especially those that lean the wrong way it is not easy to drop them where the fellers intend them to go.

The main steps in felling are: first, an undercut on the side towards which the tree is intended to fall. The undercut is made with a horizontal saw cut, then, with an axe a V-shaped cut is made above the saw cut. The depth of the undercut should be about 1/4 of the diameter of the trunk. The back of the undercut should be at right angles with the direction of the fall. Second, sawing begins on the opposite side and about 2 in. higher than the bottom of the undercut.

If the tree leans the wrong way, some guidance can be accomplished by leaving uncut wood on the side to hold the tree while cutting and wedging on the other to force the tree in the direction of the wedging. The felling crew should have a clear space a few yards from

the tree to which to retreat as the tree begins to fall. Way in which the tree leans and the side that has the heaviest part of the crown will determine to some extent which way it must fall.

Some degree of forest protection has always been necessary during felling. Forests are often injured during logging operations. Serious injuries are caused during the removal of the forests products after felling. On the work of transporting logs, standing trees may be barked and thereby exposed to subsequent attack by fungi and insects. Damage due to removal of timber, especially damage to roots near the surface, can be eliminated if logging is done on the snow.

The feller should know how to protect the forest, to plan this protection, and to avoid or minimize the damage.

Text B

Woodworking

Woodworking is the forming and shaping of wood to make useful and decorative objects. It is one of the oldest crafts and ranks as a popular hobby and an important industry. A skilled woodworker with a well-equipped home workshop can build items as simple as a birdhouse or as complicated as decorative furniture. Tools for a workshop can be purchased at hardware and department stores. Lumber retail stores and hobby shops sell a wide variety of wood.

The construction industry employs carpenters who construct the wooden framework of buildings. Other kinds of woodworkers include finish carpenters and cabinetmakers. Finish carpenters do the inside trim work around windows, cabinets, and other features that must fit exactly. Cabinetmakers design, shape, and assemble furniture, built-in cabinets, and stairways.

The history of woodworking goes back to about 8,000 B.C., when people first used an ax as a woodworking tool. In the Middle Ages, woodworkers and other craftworkers formed organizations called guilds. The guilds were similar in some ways to today's labor unions.

In 1873, electric power was used to drive machine tools for the first time. Through the years came the development of the power tools now used for woodworking. The first practical hand drill was patented in 1917. By 1925, woodworkers could buy electric portable saws for their home workshop. Today, power tools can be used in most woodworking operations, but many people enjoy shaping wood with hand tools instead.

Text C

General Engine Design

For an engine to operate normally, its cylinders must be supplied with a homogenous mixture of fuel and air in definite proportions (in carburettor engines) or with metered-out charges of fuel injected under a high pressure at strictly defined moments (in diesel engines). To reduce the amount of work done in overcoming frictions, to withdraw heat, and to prevent scuffing and premature wear, all the rubbing parts of the engine are lubricated with oil. The engine must be cooled in order to create normal temperature conditions in the cylinders. The high compression ratio in diesel engines prevents the possibility of their being started by hand, and so these engines are provided with a starting device. All engines used to power tractors, combine harvesters, and automobiles are arranged similarly and include mechanisms and systems performing similar functions.

Diesel engines powering tractors or self-propelled combine harvesters consist of the following mechanisms and systems.

The crank mechanism converts the straight line motion of the pistons into the rotary motion of the crankshaft, which is most convenient for transmitting mechanical energy to rotate the driving wheels or sprockets of tractors or self-propelled combine harvesters and to drive the live attachments of combines and other farm machines.

The timing gear controls the operation of the valves, making it possible to let air into the engine cylinders, compress it to a certain pressure, and purge the exhaust gases from the cylinders at definite positions of the pistons.

The fuel feed system provides for the delivery into the cylinders of metered-out charges of finely atomized fuel at definite moments.

The lubricating system ensures continuous delivery of oil to rubbing components and removal of heat from them.

The cooling system prevents the combustion chamber wall of the engine from overheating and maintains normal temperature conditions in the cylinders.

The starting system is necessary to crank the engine turbine starting.

Text D

Energy

Energy is one of the most fundamental parts of our universe.

We use energy to do work. Energy lights our cities. Energy powers our vehicles, trains, planes and rockets. Energy warms our homes, cooks our food, plays our music, and gives us pictures on television. Energy powers machinery in factories and tractors on a farm.

Energy from the sun gives us light during the day. It dries our clothes when they're hanging outside on a clothes line. It helps plants

grow. Energy stored in plants is eaten by animals, giving them energy. And predator animals eat their prey, which gives the predator animal energy.

Everything we do is connected to energy in one form or another.

Energy is defined as: “the ability to do work.”

When we eat, our bodies transform the energy stored in the food into energy to do work. When we run or walk, we “burn” food energy in our bodies. When we think or read or write, we are also doing work. Many times it's really hard work!

Cars, planes, light bulbs, boats and machinery also transform energy into work.

Work means moving something, lifting something, warming something, lighting something. All these are a few of the various types of work. But where does energy come from?

There are many sources of energy. Energy is an important part of our daily lives.

The forms of energy we will look at include:

- electricity;
- biomass energy - energy from plants;
- geothermal energy;
- fossil fuels – coal, oil and natural gas;
- hydropower and ocean energy;
- nuclear energy;
- solar energy;
- wind energy;
- transportation energy.

UNIT II

Грамматические основы перевода, упражнения.

- Перевод модальных глаголов и их эквивалентов.
- Анализ и перевод сложного предложения.

Лексические основы перевода, упражнения.

- Выбор лексического варианта.
- Перевод существительных с суффиксами *-ity, -ancy, -ance, -ness, -ency, -ence*.
- Перевод терминов типа «существительное + существительное».

Текст А. Forest Railroads.

Текст В. Steps in Woodworking.

Текст С. Basic Engine Performance Characteristics.

Текст D. Fossil Fuels.

GRAMMAR EXERCISES

Ex. 1. *Translate the following sentences. Pay attention to the Modal Verbs:*

1. The current can flow through a wire only when the circuit is closed. 2. The magnitude of electrical current may vary from a minute amount to a very large quantity. 3. In the ammeter the current which is to be measured flows between terminals A and B. 4. You ought to know the properties of the ingredients. 5. There must be a greater number of turns of wire on the field magnets to produce a magnetic field of adequate strength. 6. The unit of heat should not be confused with the degree of temperature. 7. This explosive may be either a liquid or a solid. 8. Computer can conduct experiments in places which are too dangerous for people.

Ex. 2. *Translate the text. Give special attention to the Modals:*

Equilibrium

With what can we associate the word “equilibrium”? We ought to know that the term applies equally well to a motor-car moving along a straight road at a constant speed. From a scientific point of view an object can be in equilibrium not only when it is standing motionless, but also when it is moving in a straight line at constant speed.

Evidently, when there are no forces pulling or pushing a body, that body must always be in equilibrium. However, objects with forces acting on them may also be in equilibrium. But, then, the forces must balance; that is, their vector sum is to equal zero.

But sometimes an object may not be in equilibrium even though the vector sum of all the forces is zero. It may have a tendency to rotate unless all the forces are applied at a single point, or unless the tendency to rotate in one direction balances the tendency to rotate in the opposite.

Thus the second condition for equilibrium is that the tendency to rotate should be zero. There are always two requirements for equilibrium: first, the vector sum of all the forces acting on a body should be zero; and, second, there must be no tendency to rotate, that is, the tendency to rotate the body in one direction must be balanced by the tendency to rotate it in the opposite direction.

We have to point out the importance of equilibrium in any engineering design and construction. For example, if a house is to stand, each of its parts must evidently be in equilibrium.

Ex. 3. *Translate the following sentences paying attention to the Modal Verbs and their equivalents:*

1. The main problem the scientists had to solve was the possibility of controlling chain reactions. 2. One should remember that there is always one more plate in the negative group of each cell of a battery than there is in the positive one. 3. The products resulting from

nuclear fission are very cheap and they can be used in industry on a very large scale. 4. The practically unlimited stores of nuclear energy should make it possible in the future to water deserts and melt the ice in the oceans. 5. The magnitude of electric current may vary from a minute amount to a very large quantity. 6. Atomic energy is to be used for the development of our industry. 7. The designer was able to construct a new device by using semiconductors. 8. After finishing the experiments the scientists will have to discuss the results. 9. The students may use all the laboratory equipment. 10. The students were allowed to show all the automatic devices.

Ex. 4. *Analyze the following sentences and translate them into Russian:*

1. If placed in an open air, iron rusts and deteriorates. 2. The three important properties affecting the flow of current in an electric circuit are voltage, resistance, and capacity. 3. Kinetic energy of an object is the energy it possesses as a result of its speed. 4. We know the alternating current to be continually changing its direction. 5. When speaking about electricity produced by friction, we should always remember the name of V.V. Petrov who made first experiments on the electrification of metals by friction. 6. The radioactive changes of matter occur of their own accord; we cannot stop or start them. 7. A body when wholly or partially immersed in a fluid is buoyed up by the fluid. 8. The number of cycles per second is the frequency of the alternating current, the most common a. c. frequency being 50 c. p. s. 9. We know iron to be magnetized in the presence of a magnet. 10. Any body, which is capable of doing work, is said to have energy. 11. While experimenting with his scheme Popov discovered the scheme to respond readily to sudden changes of electrical conditions in the atmosphere. 12. The physical laboratory where Popov worked was considered to be the best in Russia at that time. 13. Our scientists were faced with many complicated theoretical and practical problems when constructing the first atomic power station. 14. Voltage, resistance, and capacity are the three important properties to influence the flow of current in an electric circuit. 15. Although various systems of units exist for measuring different quantities, the most important and widely used are the Metric system and the English units of measurement.

LEXICAL EXERCISES

Ex. 5. *Look up the italicized words in a dictionary to choose the best translation. Translate the sentences:*

A) 1. Tractor efficiency *means* merely a measure of the amount of useful work done for every gallon of fuel used. 2. Though it is possible to detect the detonation by *means* of the engine knocking sounds, a more accurate *means* must be employed in engine tests.

3. This is by no *means* the whole story. 4. The increase in the *mean* cycle temperature is compensated for by the reduction in density of the charge.

B) 1. Solar batteries *provided* much energy for this system operation. 2. *Provided* the laboratory is equipped with modern instruments we shall be able to carry important experiments here. 3. The experiments *provided* necessary data for studying this phenomenon. 4. A direct current flows *provided* a direct voltage source is applied to the circuit.

C) *Assembly* operations have traditionally been performed manually. 2. A typical *assembly* machine consists of several stations. 3. The solar system is an *assembly* of bodies revolving about the sun.

Ex. 6. Translate the sentences below. Pay attention to different meanings of the italicized words:

A) 1. We have considerably increased the *design* of these machines. 2. The architects *design* new buildings every year. 3. The tools are *designed* for operation at assembly plants. 4. When *designing* new cars we must take into account the fact that they should not pollute the air.

B) 1. The new method will *result* in greatly increased production. 2. The *results* obtained in the experiment are of considerable importance for our investigation. 3. The end *result* of engineering is some practical thing: a machine, a tool, a gadget. 4. The application of these machine *results* in better operation of the workshop.

C) 1. We repeated the experiment several *times* to prove our hypothesis. 2. You should check the machine; it has not been used for a long *time*. 3. Four *times* five makes twenty. 4. For centuries *time* has been measured in terms of the rotation of the earth. 5. Iron molecules are magnets at all *times*.

Ex. 7. Form nouns using the suffixes and translate them into Russian:

- ity:** equal, active, relative, productive, human, popular, difficult, possible;
- ancy:** buoyant, constant;
- ance:** significant, important, clear, apply, maintain;
- ness:** thick, black, rough, clean, aware;
- ency:** efficient, frequent, sufficient;
- ence:** evident, dependent, present, exist.

Ex. 8. Translate the following terms consisting of noun + noun.

- | | |
|-------------------------|---------------------|
| 1. accelerator pedal | 8. fire adjustment |
| 2. compression pressure | 9. stop light |
| 3. fuel consumption | 10. storage battery |

- | | |
|--------------------|----------------------|
| 4. gas turbine | 11. surface friction |
| 5. heat exchanger | 12. ignition circuit |
| 6. production cost | 13. gas producer |
| 7. steam engine | 14. fuel pump |

Text A

Forest Railroads

Methods of transportation vary in different countries and in different forest types. Forest railroads are especially adopted to long hauls. If there is a very large quantity and topographical conditions are favourable, hauling logs by forest railroads on long distances is one of the most economical methods.

Railroads were formerly the most important method of log transportation. At first logging railroads were crude in their construction and methods of operation. Railroads formerly had little competitions from other methods of log transportation. Now logging railroads are frequently operated with other methods. Among these methods are motor trucks, tractors, driving, and floating.

Two classes of logging railroads are recognized: main line and spur line. Main lines are permanent for the life of the logging operation. They are designed for long hauls and at moderate speeds with steam locomotives, diesel or diesel-electric locomotives. Spurs are temporary and are designed for short hauls at slow speeds from logging landings. Forest railroads may be of standard gauge or they may be of narrow gauge.

Forest railroads represent a large per cent of the total cost in logging. The proper location of the main line is of vital importance. A forest railroad may be so located that it can be built and operated at minimum expense. The methods and cost of construction vary in accordance with local conditions. If the topography and density of timber are uniform, road construction is simple and the cost is low. Main lines must be carefully located. Spur line location is dependent on the topography and quantity of timber.

Forest railroads have many advantages. They can transport logs of various sizes and weight during the whole year; then, they do not depend on seasonal conditions, while the transportation by stream driving or floating may be used only in spring or summer.

Text B

Steps in Woodworking

Woodworking projects, together with plans for their construction, can be found in books, magazines, and manuals in bookstores and public libraries. There are five main steps in woodworking: (1) planning

and design, (2) cutting, (3) drilling, (4) fastening, and (5) sanding and finishing.

Planning and design. Careful planning can prevent mistakes and save time and materials. A scale drawing of the object being built should be made before starting any woodworking project. This drawing includes the exact measurements of the object. The craftworker marks the measurements on the wood with a pencil and lists all the steps to be followed in the project.

A woodworking tape and rule are used to measure dimensions. A square can also be used for measuring and for making straight lines and angles. Various gauges make marks and parallel lines for the woodworker to follow when cutting joints and attaching hinges.

The parts of the finished object will fit together properly if the drawing has been prepared correctly and if measuring and construction have been done accurately. A well-designed object is both attractive and the right size for its purpose. For example, a birdhouse must have an entrance that is large enough for the birds that will use it.

Text C

Basic Engine Performance Characteristics

The basic characteristics describing the performance of an engine are the engine torque, power, fuel economy, and efficiency.

Some of the heat energy evolved in the process of burning fuel in the cylinders of an engine is converted into mechanical energy. The gas pressure force acting upon the piston is transmitted through the connecting rod to the crankthrow and thus applies torque to the crankshaft.

Torque is the product of the force rotating the crank and the crank radius. Torque is expressed in units of Newton meters (N m). While an engine is developing torque, it performs work. The amount of work done in unit time is termed power.

Engine power is measured in kilowatts (kW). A distinction is made between the indicated power and the electric power of an engine. The indicated power is the power developed by combustion gases in the cylinders of the running engine. The effective, or brake, power is the power that is delivered at the crankshaft. The effective power of an engine is 10 to 12% less than its indicated power, because some power is lost in overcoming friction forces in the engine mechanisms and in driving auxiliary equipment (pumps, fan, generator, etc.). The engine power consumed in overcoming these losses is known as friction power.

The mechanical efficiency of an engine is the ratio of its effective (brake) power to indicated power. It depends mainly on the quality of

machining and lubrication of the engine components and workmanship in assembling the engine. The numerical value of this characteristic ranges between 0.8 and 0.9.

The thermal efficiency of an engine is the ratio of the amount of heat actually converted by the engine to mechanical energy to the amount of heat contained in the fuel used by it. The thermal efficiency of an automobile and tractor engines is in the range from 0.26 to 0.37.

The fuel economy of an engine is characterized by its specific fuel consumption which is determined by dividing the hourly fuel consumption of the engine by its effective power. An engine with worn, improperly adjusted, or poorly lubricated rubbing parts will have its power output and fuel economy reduced.

Text D

Fossil Fuels

There are many different ways in which the abundance of energy around us can be stored, converted, and amplified for our use.

The energy sources are split into three categories: fossil fuels, renewable sources, and nuclear sources. The fossil fuels are coal, petroleum, and natural gas. The renewable energy sources are solar, wind, hydroelectric, biomass, and geothermal power. The nuclear-powered sources are fission and fusion.

Fossil fuels have been a widely used source of energy every since the Industrial Revolution just before the dawn of the 20th century. Fossil fuels are relatively easy to use to generate energy because they only require a simple direct combustion. However, a problem with fossil fuels is their environmental impact. Not only does their excavation from the ground significantly alter the environment, but their combustion leads to a great deal of air pollution.

The theory behind fossil fuels is actually quite simple. Burning coal, natural gas, and petroleum releases energy stored in the fuel as heat. The energy contained by the fuels is derived from the energy of the sun.

The heat that is recovered upon combustion of the fuel can be used by us in several ways. Industrial processes that require extremely high temperatures may burn a great deal of very pure coal known as “coke” and use the energy released to directly heat a system. Some people make use of clean burning natural gas to heat their homes. Combustion of fossil fuels can also be used to generate electricity; the fuel is burned to heat water, and the steam from the boiling water spins turbines that power a generator, thereby manufacturing electricity:

Advantages:

1. Depending on fuel, good availability.

2. Simple combustion process can directly heat or generate electricity.

3. Inexpensive.

4. Easily distributed.

Disadvantages:

1. Probable contributor to global warming.

2. Questionable availability of some fuels.

3. Cause of acid rain

UNIT III

Грамматические основы перевода, упражнения.

- Перевод инфинитива.
- Предложные обороты и их перевод.

Лексические основы перевода, упражнения.

- Изменение значения слов.
- Перевод существительных с суффиксами *-er, -or, -ent, -ant*.
- Перевод терминов типа «причастие I + существительное».

Текст А. Log Transportation.

Текст В. Cutting and Drilling.

Текст С. Diesel Engine.

Текст D. Fission.

GRAMMAR EXERCISES

Ex. 1. *Change the sentences according to the model. Translate the sentences into Russian:*

Model: The text is easy. It *can be translated* without a dictionary.

– The text is *easy (enough) to be translated* without a dictionary.

1. The student is clever. He can solve this problem quickly.
2. The man is energetic. He will succeed. 3. The subject is fascinating. It must be discussed. 4. He was rich. He could finance various organizations. 5. Professor Jones is experienced. He can supervise the work of the most gifted graduates. 6. This factor is important. It should be taken into consideration. 7. The problem is too complicated. It can't be solved at once.

Ex. 2. *Define the Infinitive in the sentences below. Translate the sentences:*

1. The equipment to be installed in the workshop has specific use. 2. The aim of an instrument panel is to provide the driver with certain information. 3. The automobile to be developed will run on hydrogen. 4. You must go to the service station in order to repair the brakes. 5. The new method to be used in this experiment is very efficient. 6. They were looking for somebody to help them in their

work. 7. Man has used fire to cook and to warm his shelters ever since. 8. Geothermal energy began to be used to heat up houses and to produce electricity. 9. It is important for us to learn that whatever the energy source of the future turns out to be, we must learn to conserve and value it. 10. The Netherlands was the first country to find coal in Europe and it provided the fuel to England and other nearby countries.

Ex. 3. *Define the function of the Infinitives in the following sentences and translate them into Russian:*

1. To assign a numerical value to the inertia of any given body, we choose as a standard some body whose inertia is arbitrary taken as unity. 2. Devices for changing ac into dc are needed to charge storage batteries. 3. The radio signal is too weak to be detected at this distance. 4. Galileo carried out a special experiment to prove that heavy objects fell not faster than light ones. 5. Even the most advanced electronic equipment cannot directly measure electromagnetic frequencies higher than roughly 100 GHz. 6. To explain this simple fact is not so very easy. 7. To give a true picture of the surrounding matter is the task of natural science. 8. We are to study the main laws of physics. 9. In our experiment we were to compare the two gases. 10. New sources of cheap energy are to be found. 11. To define exactly what is meant by the total heat in a body is at present still not possible. 12. The effect is too small to be detected. 13. Many examples of this anomalous behaviour are to be found in literature. 14. To express a measurement, there must be a basic unit of the quantity involved. 15. Some computers are used in carves and mines to replace workers.

Ex. 4. *Translate into Russian paying attention to the prepositions and prepositional phrases:*

1. According to Boyle's law the volume of a gas is inversely proportional to its pressure. 2. Because of their energy, the molecules of a liquid are always in rapid motion. 3. The a.c. voltages are changed by means of magnetic induction. 4. Quartz is one of the crystals showing an electrical effect due to compression. 5. Owing to loss of heat by radiation and friction, heat engines convert only part of heat into useful work. 6. A gas can be dissolved in a liquid; in this case the liquid changes its boiling point. 7. Polzunov's engine was the first steam engine used instead of water wheels. 8. By means of an electric battery it is possible to direct the flow of electrons in a conductor. 9. Semi-conductors are used now in radio-sets instead of conventional radio-tubes. 10. Owing to food shortage and inadequate equipment the expedition could not reach the North Pole. 11. Unlike the diamond, graphite is quite soft, has a specific gravity of 2.3, and conducts electricity.

Ex. 5. *Translate the following sentences into Russian:*

1. In accordance with the regulations there is an electric screen wiper on the driver's side. 2. In addition to the normal adjustment of the bench-type front seat, it is possible to make alternations to the height and rake of the seat itself. 3. There are differences between various plugs according to the engine in which they are intended to be used. 4. Aluminium radiators are attractive because of their light weight and good heat conductivity. 5. Today owing to the great improvements in the processing of petroleum fuels detonation no longer maintains. 6. In spite of the high price of fuel, a small engine offers no advantage. 7. If air is used instead of oxygen, there will also be nitrogen in the combustion products.

LEXICAL EXERCISES

Ex. 6. *Translate the following sentences into Russian:*

1. Radio signals are sent in short bursts. 2. A new large plant has lately been constructed near Kiev. 3. By the 15th of January the Leningrad Metro was ready to receive the first passengers. 4. New coal deposits have been found near Moscow. 5. Everest is the highest mountain of Himalayas. 6. The plane flew so high that we nearly lost sight of it. 7. The late arrival of the ship was due to the bad weather. 8. He came too late to take part in the experiment. 9. The engine stopped short. 10. The expedition is shortly leaving for the North Pole. 11. The region of influence of magnetic forces near a magnet is called a magnetic field. 12. A high mast is required to support the television antenna. 13. The flag was fixed high on the building. 14. Short waves are widely used in radio-communication. 15. One of the main parts of the cyclotron is a large, powerful magnet. 16. We use short radio waves largely for long-distance communication. 17. The velocity of the sound can be readily measured.

Ex. 7. *Choose the correct word in brackets. Translate the sentences:*

1. So far meteorites are the only bodies of celestial origin that can be (ready, readily) subjected to immediate laboratory study. 2. Comprehensive meteorite study is (high, highly) important for the solution of the problem of the origin of planets. 3. The final answer to these questions can (hard, hardly) be given at present. 4. The discussion was centered (large, largely) on the origin of meteorites and their role in solar system. 5. One of the scientists delivered a (short, shortly) report. 6. A geochemist from St-Petersburg presented (high, highly) interesting data on meteorites. 7. This method has been (late, lately) developed in the Russia. 8. The professor told the conference about calculations of the effect of meteorite collision against the (hard, hardly) surface of other planets when travelling at a (high, highly) speed. 9. (High, highly) effective instruments will (short, shortly) be

(ready, readily) for use in the man-made earth satellite. 10. They will detect the contact of (hard, hardly) meteoric dust flying (near, nearly) the atmospheric layer.

Ex. 8. Form nouns using the suffixes and translate them into Russian:

- er:** listen, read, convert, provide, fight, contain, boil;
- or:** direct, inspect, resist, conduct, compress, react, ventilate, generate;
- ent:** differ, depend, absorb;
- ant:** lubricate, propel, assist.

Ex. 9. Translate the terms which are composed of Participle I + noun into Russian:

Model: adding element

↓
какой? ← ЭЛЕМЕНТ

↓
суммировать

суммирующий элемент

- | | |
|-----------------------|-------------------------|
| 1. steering system | 7. adjusting screw |
| 2. floating mounting | 8. regulating wheel |
| 3. trailing tools | 9. cutting edge |
| 4. rolling resistance | 10. mixing chamber |
| 5. driving wheel | 11. boiling point |
| 6. charging current | 12. actuating mechanism |

Text A

Log Transportation

One of the most important problems in the timber industry of many countries is to find economic ways of transporting logs. Wood is an extremely heavy and bulky commodity in proportion to its value, therefore, transportation costs are relatively high.

Transportation can be divided into two parts:

- 1) log assemblage (skidding);
- 2) the main log haul (hauling).

Skidding consists of bringing the logs together at a common point, a convenient skidway. The main log haul (hauling) consists of hauling the logs from skidways or landings, to the log yards or to the mills.

The development of the logging industry changed log transportation methods radically. Today railroads, tractors and motor trucks have come prominently into the timber industry as the main method of log transportation and have vitally changed the method of transporting logs. A good complete and permanent system of roads

simplifies and reduces logging costs to a minimum. Transportation facilities are the heart of successful logging.

Various systems may be employed in determining the cheapest method of transportation. It is often a serious problem to determine whether the tractors, trucks, railroads or streams may be used to the best advantage. The correct solution of the transportation problem is the key to successful logging.

The planning of the transport network and the selection of types of transport systems depend on a number of factors. In making the basic technical and economic calculations the following must be taken into account:

- 1) the annual volume of production;
- 2) the operation and process undertaken;
- 3) the condition of the stands;
- 4) the logging method used;
- 5) skidding costs;
- 6) the cost of the constructing roads;
- 7) maintenance cost.

The following types of roads may be distinguished:

- 1) main roads built for use during a number of years;
- 2) minor roads called spurs which carry a small volume of traffic;
- 3) collecting roads.

Modern forestry has many aspects involving a lot of important problems, one of the main one being the need to reduce the costs in all forest activities. The goal of the advanced forest policy is not only to grow trees but also to produce valuable timber suitable for the processing industries, including the routes over which the timber is moved from the forests.

Text B

Cutting and Drilling

Cutting wood to the right size and shape can be done with a variety of hand and power tools, including saws, chisels, and planes. The largest and most familiar handsaws are the crosscut saw and the rip saw. Crosscut saws cut across the grain of the wood, and rip saws cut with the grain.

Power tools can do a job far more quickly, easily, and accurately than hand tools. For example, a circular saw has a toothed disk that spins at great speed. Different blades can be attached for a variety of cutting operations, such as crosscutting and ripping.

A common hand tool for cutting joints is the backsaw, which has a thin rectangular blade for fine work. The blade has a metal bar along its back to make it stiff. Chisels, which can cut deeply into the surface

of wood, can be used for making joints or for trimming and carving. A portable electric router has attachments called bits that can be used to trim or shape wood and to make joints and decorative cuts. A hand tool called a coping saw consists of a metal frame that holds a narrow blade used for cutting curves in wood. Jigsaws and saber saws, power tools that cut curves, have a thin blade that moves up and down at great speed.

Mechanical planes, called jointers, and hand planes have sharp blades that smooth and shape wood. A wood-turning lathe shapes wood into rounded forms by rapidly spinning it against a cutting edge held by the operator. A file shapes wood in places where a sharper cutting tool does not fit. Files can also sharpen tools.

Drilling enables a woodworker to connect sections of wood with screws, metal plates, and hinges. Drilling may also be required when constructing some joints. Braces and hand drills have bits to make holes of different sizes for various purposes. Portable electric drills and drill presses also use bits to drill holes. They have attachments for sanding and other purposes.

Text C

Diesel Engine

The diesel engine is any internal-combustion engine in which air is compressed to a temperature sufficiently high to ignite fuel injected into the cylinder where combustion and expansion actuate a piston. It converts the chemical energy stored in the fuel into mechanical energy which can be used to power freight trucks, large tractors, locomotives, and vessels. A limited number of automobiles also are diesel-powered as are small electric-power generators.

The diesel engine differs from other internal-combustion engines such as gasoline engines that induct and moderately compress an inflammable mixture of air and vaporized or gaseous fuel and then ignite it by an electric spark. It employs no ignition devices and so it is often called a compression-ignition engine. The possibility of compression ignition appears to have been first mentioned by the French physicist Sadi Carnot in 1824. The principle on which the modern automobile engine operates was conceived in 1862 by Alphonse Beau de Rochas, also of France; however, it was not applied to a practical engine until 1876, when the German engineer Nikolaus Otto built the first engine in which the charge (fuel-air mixture) was compressed in the cylinder before burning. This was the engine that Rudolf Diesel, a German engineer, undertook to improve when he started the experiments that led to the diesel engine.

Diesel presumably thought that any fuel would be suitable for an engine operating in the manner he described. He attempted to build an engine that would burn powdered coal, the cheapest conceivable fuel. The coal-burning project, however, was soon abandoned, and oil-burning version of the engine was completed in 1897.

Text D

Fission

Fission is already an established method of energy production. Countries around the world possess fission reactors capable of powering whole cities. The benefits in energy production, however, are shadowed by disturbing accounts of harm to the environment and dangerous nuclear waste by-products. Chernobyl, Hiroshima, and Nagasaki are frightening precedents in the field of fission development and are not to be ignored.

Nuclear fission involves the splitting of a heavy element into lighter elements. The reaction is set off by the random capture of a stray neutron.

On July 16, 1945, the first atomic bomb was detonated at Alamogordo, New Mexico. Less than a month later, on August 6, 1945, the United States dropped an atomic bomb on the Japanese city of Hiroshima, killing more than 100,000 people.

Although the significance of the famous "mushroom cloud" has been downplayed or even portrayed as comical, the potential damage by fission power is no laughing matter. Fission-based weapons have already killed many people, and still have the potential for more destruction. An example of the dangers of fission is the famous Chernobyl incident. On April 26, 1986, the carbon control rods in the Chernobyl fission reactor near the town of Chernobyl in the former USSR caught on fire and caused an explosion in the reactor. A radioactive cloud spread across northern Europe and even parts of England. Russian authorities reported 31 deaths from the incident. Over 100,000 citizens were evacuated from the area. The incident pointed out to the world the dangers of fission power plants.

Advantages:

1. Relatively little fuel is needed and the fuel is relatively inexpensive and available in trace amounts around the world.
2. Fission is not believed to contribute to global warming or other pollution effects associated with fossil fuel combustion.

Disadvantages:

1. Possibility of nuclear meltdown from uncontrolled reaction – leads to nuclear fallout with potentially harmful effects on civilians.

2. Waste products can be used to manufacture weapons.
3. High initial cost because plant requires containment safeguards.

UNIT IV

Грамматические основы перевода, упражнения.

- Перевод инфинитивного оборота *Complex Object*.
- Союзные обороты и их перевод.

Лексические основы перевода, упражнения.

- Перевод интернациональных слов.
- Перевод существительных с суффиксами *-ion, -ation, -ment, -ure*.
- Перевод терминов типа «причастие I + существительное».

Текст А. Logging.

Текст В. Steps in Woodworking: Fastening, Sanding and Finishing.

Текст С. Carburettor.

Текст D. Fusion.

GRAMMAR EXERCISES

Ex. 1. *Define the Complex Object in the following sentences.*

Translate them into Russian:

1. I asked him to inform me about the results of the test. 2. We know the sun to be intensely hot. 3. We know the storage batteries to contain chemicals generating electric current under certain conditions. 4. We know all bodies to consist of atoms. 5. We know the specific heat of a substance to be defined as the amount of heat required to raise unit weight of the substance through 1° of temperature. 6. We know the Ohm to be the standard unit of resistance. 7. We suppose the first watermill to have been introduced more than 2,000 years ago. 8. By dropping from a high tower two balls of different size but of the same material Galileo found light objects to fall as fast as heavy ones. 9. We know the electric current to consist in the motion of electrons through an electric conductor. 10. We know storage batteries to have two terminals, the positive terminal being marked with a plus sign and the negative one with a minus sign.

Ex. 2. *Translate the sentences paying attention to the Objective Infinitive Construction (Complex Object):*

1. This device enables the students to measure the current in the circuit. 2. The analysis permitted them to obtain new data. 3. Modern equipment caused us to introduce new methods. 4. The flow of water makes the wheel turn. 5. His discovery allowed an invention to be made. 6. We know the German inventors Daimler and Benz to invent the first automobile. 7. We know energy to do work. 8. The professor expected the students to have finished their experiments already. 9. We saw the dimensions of the body change under different temperature

conditions. 10. The engineers wanted this phenomenon to be investigated in their laboratory. 11. They have shown this substance to be unique in its properties. 12. We know wood to absorb moisture quite easily. 13. He considers all the forces acting upon a body to be localized at a point. 14. The workers expect the designer to improve the operation of these machines. 15. They supposed the greater part of energy to be used for supplying plants in that region.

Ex. 3. *Translate the following sentences:*

1. Thermal condition occurs continuously as long as temperature difference is maintained. 2. Both the state of rest and the state of motion in a straight line can be changed only due to some force applied by another body. 3. In early times the woods and riverbanks in Europe abounded in animals which today are either extinct or occur only in southern lands. 4. The atomic bomb is not so devastating as the hydrogen bomb. 5. The smoother the surface and the lighter the object on it, the less is the minimum force that must be applied to produce motion. 6. Water is as necessary for life as air or food. 7. The direct current is not so widely used in everyday life as the alternating current. 8. When glass and porcelain are heated they neither lose nor gain in weight. 9. The more work a body can do, the more energy it possesses. 10. The Peking library contains the most ancient books in existence as well as the works in computing science. 11. The faster an object moves the greater is the air resistance. 12. The expedition started as soon as all the preparations were completed. 13. The finer the graduations on the instrument's scale and the greater the ease with which they can be read, the more precise the measurement.

Ex. 4. *Translate the text. Mind the conjunctions:*

Chemical Energy

We know that heat is generated at reactions, as in the reactions of compounds with oxygen, with chlorine, with sulphur, etc. We also know that as far as possible industry strives to utilize these heat exchangers in order to economize fuel.

Heat is evolved in synthetic reactions as well as in other kinds of reactions. Thus, for example, we notice that when hydrogen peroxide is decomposed by means of manganese dioxide, the test tube becomes perceptibly warm. And when we displace both the hydrogen of sulphuric acid by zinc and the copper of copper sulphate by iron, we also note an evolution of heat. A vast amount of heat is generated as soon as an explosive substance is decomposed. Chemical reactions may be accompanied by other phenomena besides the evolution of heat. Thus in a number of reactions as in reactions of combustion, the synthetic reactions of chlorine, and the explosion of gunpowder, we

have an emission of light as well as the evolution of heat. Some reactions produce electricity. Heat, light, and electricity are different modifications of energy.

Most commonly we use energy either in the form of chemical energy or in the form of mechanical energy.

In certain branches of industry chemical energy is not so widely used as mechanical energy.

One form of energy can be transformed into another, but it can be neither created, nor destroyed.

The more chemical energy a substance contains the more mechanical energy can it give.

Pyroxiline and dynamite contain great stores of chemical energy and they produce a vast quantity of mechanical energy when they explode, bursting huge rocks, destroying buildings, etc.

LEXICAL EXERCISES

Ex. 5. *Translate the following international words into Russian:*

vacuum, vibration, temperature, resource, motor, diameter, project, test, energy, control, information, atmosphere, mechanism, gas, material, plastics, special, transport, electricity, locomotive, radiation, version, configuration, modification, dominate, alternative, method, reactor, process, balance, mechanical, theoretical, rocket, tendency, electromagnetic, plasma, radius, engineer, proportion, chemistry, effective, tractor, modern, battery, contact.

Ex. 6. *Form nouns using the suffixes and translate them into Russian:*

- ion:** coordinate, ventilate, insulate, educate, generate, pollute;
- ation:** conserve, transport, inform, install;
- ment:** develop, require, equip, achieve, improve, measure;
- ure:** explode, expose, fail, mix, architect.

Ex. 7. *Translate the terms which are composed of Participle I + noun into Russian:*

- | | |
|------------------------|--------------------------|
| 1. expanding shoe | 7. controlling equipment |
| 2. rotating part | 8. machining operation |
| 3. cultivating tractor | 9. determining factor |
| 4. assisting brake | 10. lubricating system |
| 5. locking device | 11. equalizing action |
| 6. driving sprocket | 12. operating condition |

Text A

Logging

The logging operation is the process of converting standing trees into sawlogs.

Logging has also to do with the production of large quantities of pulpwood, crossties, poles, piling, mine timber, veneer logs, bolts and miscellaneous other forms. Practically all are produced as logs in the round form of varying lengths. They are later converted into the refined form of the final production in square or rectangular shapes.

The logging process is not constant. It is developing and improving constantly. Historically it has been a highly seasonal enterprise by low worker output. Now instead of seasonal labour force recruited from villages during the slack season permanent timber production units are established. These are complete villages with homes, schools, hospitals and other facilities for a logging and timber handling enterprise.

The main phases of the logging process are: 1) the work in the felling area; 2) transportation of the logs; 3) the work in the lower yard.

The work in the felling area includes: felling, limbing and skidding.

The second phase includes transportation of logs by motor trucks and railways.

Lower yards are the concentration points where logs or trees are delivered from the woods for sorting, bucking, piling and further processing. Lower yards appeared as a result of the prevailing practice of tree-length logging. The tree-length stems are delivered either by railway or by trucks; here the stems are reduced to lengths which are determined by the intended utilization, species, and quality. The lower yards are equipped with electrical-powered portable saws, lo-sorting conveyors to separate logs by species, size, and end use.

Recently a more scientific approach has been made to the problems of logging and the profitability of removing the logs of different species and sizes. Progress in the development of logging method during the last decade has been considerable.

Text B

Steps in Woodworking: Fastening, Sanding and Finishing

Fastening. Sections of wood are fastened together with metal fasteners, such as screws and nails, and with adhesives. Tools for fastening include screwdrivers and hammers. Screwdrivers insert screws that connect sections of wood and hold hinges and metal plates. Hammers are used to drive in nails and a variety of other types of metal fasteners.

Gluing is one of the oldest methods of fastening sections of wood and a variety of adhesives are used in woodworking. Polyvinyl resin emulsion glue, or white glue, can be applied directly from the bottle. It should not be used if it will come in contact with water or high

temperatures. Urea-formaldehyde resin glue and resorcinol formaldehyde resin glue both must be mixed by the user. Urea glue can resist cold water for short periods, but it cannot withstand high temperatures. Resorcinol glue is waterproof and heat resistant. After gluing, wood should be put into clamps for as long as 12 hours. The length of time depends on the temperature, kind of wood, and type of glue. Clamping holds the wood in place and spreads the glue into the pores.

Sanding and finishing. Sanding removes tool marks and makes wood surfaces smooth for finishing. Sanding should not begin until the wood has been cut to its final size. Most abrasive paper manufactured for use by hand has rough particles of the minerals flint or garnet. Aluminum oxide is a common sanding material used in such machines as a portable belt sander or a vibrating sander. Portable belt sanders work better than vibrating sanders on large wood surfaces.

Woodworkers use a variety of finishes to protect wood and to bring out the beauty of the grain. A stain is a dye that colors wood without hiding the pattern and feel of the grain. Paint covers the grain of the wood and provides a color of its own. Varnish, shellac, and lacquer add a hard, glossy finish while exposing the beauty of the wood. Wax protects varnish and has a smooth, shiny finish when polished. Enamel is a type of glossy paint.

Text C

Carburettor

The function of the carburettor is to prepare a mixture of air and gasoline vapour in the proper proportion for efficient combustion. The carburettor must spray or atomize the fuel and thoroughly intermingle its particles with those of the combustion air.

One requirement that makes the carburettor problem difficult is that a mixture of the correct proportions must be delivered to the engine under all the operating conditions from idling to full load. Another thing that adds to the difficulty of the problem is that gasoline is not uniformly volatile. Gasoline-air mixtures have fair definite upper and lower limits of ignitability, but whether or not a mixture is ignitable depends on the proportion of air to gasoline actually vaporized and mixed with air, and not on that of total amounts of air and gasoline there may be in the cylinder at the moment the spark occurs. When the engine is cold, only the more volatile fractions of the gasoline will vaporize, and in order that under these conditions the mixture may be sufficiently rich to ignite, much more gasoline must be supplied than under normal operating conditions. The heavier fractions of the fuel do

not vaporize, hence they do not burn, but pass through the engine unconsumed.

Under all normal conditions it is desirable to run on what is known as the maximum-economy mixture which contains one part by weight of gasoline to between 16 to 17 parts of air. For quick acceleration and for maximum speed up grades, it is desirable to have a somewhat richer mixture, the so-called maximum-power mixture which contains one part by weight of gasoline to from 12 to 13 parts of air. With the maximum-economy mixture, the power developed is only about 90 per cent of the maximum. The carburettor therefore must be able to supply:

- a very rich mixture when starting from cold;
- a comparatively lean mixture for normal operation;
- a slightly rich mixture for additional power when that is required.

These changes in mixture ratio are effected automatically.

Text D

Fusion

For years now people have been turning to fusion as the “energy of the future”. Not only does fusion appear to be an extremely effective source of energy production, it is environmentally friendly and virtually inexhaustible.

The energy that comes from the process relies on the joining, or “fusing”, of two atoms to form a new molecule. When this larger, relatively unstable molecule splits apart, it releases energy. The most common fusion process occurs with tritium and deuterium. Tritium and deuterium are just big names for different isotopes of hydrogen.

So we know that tritium and deuterium fuse and then split apart to create energy. Tritium atoms have 1 proton and 2 neutrons, and deuterium atoms have 1 proton and 1 neutron. So when a deuterium and a tritium bang together, a molecule with 2 protons and 3 neutrons is formed. This molecule splits into an extremely stable helium atom (2 neutrons and 2 protons). The extra neutron is simply released altogether.

There are two explanations for the production of energy, one general and one mathematical. The general explanation is that because the process results in the formation of helium, and because helium is more stable than deuterium and tritium, the system has gone from a state of high potential energy to low potential energy, and thus kinetic energy is given off.

A more mathematical explanation is derived from Albert Einstein’s famous equation, $E=mc^2$. The total mass of a helium atom

and a neutron (the products of the reaction) is less than the total mass of a deuterium atom and a tritium atom (the reactants). The “missing mass” has in fact been converted to energy based on Einstein’s equation.

Fortunately for the future of fusion power, tritium and deuterium are virtually inexhaustible resources. There is 1 deuterium atom in every 6500 hydrogen atoms in ordinary seawater. Tritium, the other reactant, can be bred from lithium, an element common in the earth’s crust.

Thus, theoretically, humans can continue to utilize fusion power indefinitely. After all, the amount of seawater on earth is practically unlimited.

UNIT V

Грамматические основы перевода, упражнения.

- Перевод инфинитивного оборота *Complex Subject*.
- Перевод сравнительных конструкций *as...as*, *not so...as*, *than*.

Лексические основы перевода, упражнения.

- Адвербиальные обороты и их перевод.
- Перевод существительных с суффиксами *-age*, *-ing*, *-ance*, *-ence*, *-ity*.
- Перевод терминов типа «существительное + причастие I + существительное».

Текст А. New Equipment in Logging.

Текст В. Tool Care and Safety.

Текст С. Working Cycle of the Four-Stroke Diesel Engine.

Текст D. Alternative Energy and Its Sources.

GRAMMAR EXERCISES

Ex. 1. Define the Complex Subjects in the following sentences. Translate them into Russian:

1. Atomic energy is likely to become the main source of power-supply in the years to come. 2. The weather is unlikely to change for the better in the coming days. 3. A video-amplifier is expected to cover a very wide range of frequencies. 4. Temperature changes appear to have no effect on this substance. 5. The study of electricity seems to have begun about 1600 when the first book on experiments in electricity appeared. 6. The storage batteries are known to contain chemicals generating electric current under certain conditions. 7. When the wire is connected in such a manner that the current can flow through it, the circuit is said to be closed. 8. The new method is believed to have given good results. 9. This method does not seem to offer any advantages over

that discussed above. 10. Watermills are supposed to have been introduced more than 2,000 years ago.

Ex. 2. *Translate the sentences into Russian:*

1. Watt's engine soon proved to have the greatest significance of being the driving force of the Industrial Revolution. 2. A circular saw is known to be a versatile tool for both rough and finish cutting. 3. Kinetic energy is said to be associated with moving objects. 4. The quantum theory elaborated by Max Planck is believed to have revolutionized not only physics but also chemistry and other fields. 5. Computers are expected to become one of the key tools of modern industry. 6. Atoms were found to change not only by radioactive decay but also by more dramatic processes – nuclear fission and fusion – with the release of large amounts of energy. 7. Electronics seems to have been fundamental in developing new communications devices (radio, television, laser, etc.). 8. Measurement is said to be the determination of the magnitude of a quantity by comparison with a standard for that quantity. 9. Body's kinetic power and also its mass are known to be increasing when the speed becomes higher. 10. Every theoretical argument is required to have its material embodiment.

Ex. 3. *Translate into Russian. Pay attention to the Comparative Constructions:*

1. This machine is as reliable as that. 2. This motor can supply as much energy as required. 3. The speed of changes in technology is as fast as the machines are ruling in the world. 4. This new automatic equipment can be easier programmed than reprogrammed. 5. This device is not so useful as that one. 6. Machine-tools with electrical drive are faster and more accurate than hand tools. 7. Unfortunately, this engine cost as much as steam engine and was just as slow. 8. The first generation computers were much slower than modern machines. 9. The multitask computers treat the incoming data in much the same way as the earlier computers did. 10. A fax-machine can transmit written messages as quickly as electronic mail can.

LEXICAL EXERCISES

Ex. 4. *Translate the following sentences into Russian:*

1. We could not notice in the rotating shaft any vibrations *at all*.
2. *At first* man learned how to keep up a fire and then how to obtain it by rubbing dry sticks together or by striking sparks out of stone.
3. After many experiments we have *at last* liberated oxygen from this compound.
4. Some materials are found to lose their electrical charge *at once*.
5. *In fact*, there is no difference in the lines of force or in their action whether the field is produced by a permanent magnet or an electromagnet.
6. The controlled release of nuclear energy promises to lead us into a new world in which the achievement of man will not be

any longer limited by the supply of energy available to him. 7. *At last* the radio-message reached the expedition. 8. Alternating current of high frequency tends to flow on the surface of a wire; thus the centre of the conduction is, *in fact*, of no use *at all*.

Ex. 5. *Translate the text into Russian; pay attention to the adverbial phrases:*

Classification of Fuels

The principal fuels used at present for making steam, are coal, coke, wood, charcoal, peat, mineral oil, and natural and artificial gas.

All kinds of fuel may, in fact, be virtually subdivided into three classes: solid, liquid, and gaseous.

All coals seem to be derived from vegetable origin and their differences appeared as a result of the varying conditions under which they were formed. Anthracite coal consists almost entirely of carbon and inorganic matters; it contains little or no hydrocarbon at all. Some varieties appear to approach graphite in their characteristics and are burned with difficulty unless at first mixed with other coals. Good anthracite is hard, compact, and lustrous. It burns with very little flame unless it is moist, and gives a very intense fire, free from smoke. Even when carefully used, it is liable to break up at high temperatures and, in this way, the fine pieces may be lost with the ash. Semi-anthracite contains some hydrocarbon, is less dense than anthracite, ignites at once, and burns readily with a short flame.

Bituminous coals contain a large and varying per cent of hydrocarbons or bituminous matter. Their physical properties and behaviour, when burning, vary widely so that classification is difficult, though at least three kinds may be distinguished as follows: dry bituminous coals, caking bituminous coals and, at last, long-flaming bituminous coals. The latter has a strong tendency to produce smoke; some do and some do not cake at all while burning.

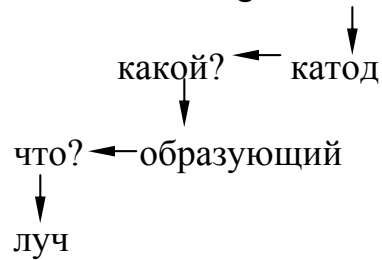
Charcoal is made by charring wood; it is no longer used for making steam but is widely applied for special metallurgical purposes.

Ex. 6. *Form nouns using the suffixes and translate them into Russian:*

- age:** leak, break, use, pass, volt;
- ing:** begin, broadcast, build, draw, coat;
- ance:** assist, resist, appear, acquaint, clear;
- ence:** exist, interfere, refer, differ;
- ity:** dense, intense, elastic, electric, able, probable.

Ex. 7. *Translate the following terms (noun + participle I + noun):*

Model: beam-forming cathode



лучеобразующий катод

1. timber-hauling tractor
2. track-laying machine
3. direction-finding receiver
4. weight-carrying roller
5. clearance-adjusting means
6. fuel-metering orifice
7. oil-distributing channel
8. voltage-regulating system
9. turbulence-inducing formation
10. road-holding quality

Text A

New Equipment in Logging

All over the world the wood industry is entrenched in what can be called a technical revolution. The technical revolution is bringing a tremendous growth of labour productivity in logging.

Automation is considered now to be the highest stage in the development of the logging industry. Automation of production processes is closely linked with the introduction of computers. The application of cybernetics to logging would be impossible without a technical base. Such a base includes high-speed computers.

Great interest is attached to studying the use of computers as applied in the logging industry. In logging as in many other industries slow-hand methods of calculating data are becoming obsolete. In their place are computers that do the same work in milliseconds.

Electronic computing technique finds broad application in logging now. The following can be given as examples of how computers can help timber-men. Computers may calculate the term of equipment maintenance and building costs. Tabulation and analysis now requiring a year or more can be done in about one minute. These electronic instruments provide a quick and easy way to gather data from millions of acres of forest land. These instruments can give the average number of trees in the felling area. They are widely used in floating.

Computers find broad application in forest road planning and in road building. The use of computers in the construction of forest roads and other forest transport installations makes it possible to:

1. Improve the planning of transport and storage systems;
2. Plan the most economic detailed layout;
3. Reduce the time needed for research work in logging;
4. Reduce the time needed for planning in logging;
5. Reduce instrument costs and so on.

Controlled by computers logging enterprises will operate at their maximum efficiency. This will raise the standard of production, increase the output and improve logging conditions.

Text B

Tool Care and Safety

Tools are made to be safe when used correctly. They can be preserved – and accidents can be prevented – by using the right tools for the job and keeping them clean and sharp. A woodworker must use extra pressure with a dull tool, and injury could result if the tool slips. Many tools can be sharpened on the rough surface of an oilstone. A broken or damaged tool does not work properly and should not be used.

Whenever possible, wood should be held in a vise or by clamps, so that both hands are free to handle the tool being used. Floors should be kept clean of such substances as sawdust and finishing materials, which are slippery and also could catch fire. Safety glasses should always be worn during cutting and boring operations in order to protect the eyes from flying particles of wood. Loose clothing and jewelry that could get caught in a machine should not be worn in a woodworking area.

A craftworker can prevent accidents by holding a portable power tool until all the moving parts have stopped. A machine should never be left running unattended. In addition, a machine should be disconnected when not in use. The hazard of receiving an electric shock can be reduced by connecting ground wires to machines that have not been previously grounded.

Text C

Working Cycle of the Four-Stroke Diesel Engine

An event (a part of the engine cycle) that occurs in the engine cylinder during one piston travel is called a stroke. The engine which completes its working cycle in four strokes of the piston is known as the four-stroke-cycle, or simply four-stroke, or four-cycle, engine.

1st Stroke-Intake. The piston is moved by the crankshaft and connecting rod downwards and, acting like a pump piston, it produces a

vacuum in the cylinder. Fresh air is taken into the cylinder through the open intake valve, as a result of the pressure differential between the cylinder and atmospheric air. The exhaust valve is closed. At the end of the intake stroke, the intake valve closes.

2nd Stroke-Compression. The crankshaft continues to rotate, so the piston starts moving upwards. Since both the intake and the exhaust valves are closed, the piston compresses the air in the cylinder. As the air is compressed, its temperature goes up. The compression ratio of the diesel engine being fairly high, the pressure in the cylinder rises up to 4 MPa and the air gets heated up to 600° C. At the end of the compression stroke a charge of finely atomized diesel fuel is injected into the cylinder through the fuel injector.

3rd Stroke-Power, or expansion. On coming into contact with the hot compressed air in the cylinder, fine fuel particles are self-ignited. The injection and burning of fuel go on for some time. Because of a delay in the self-ignition of fuel, it burns mainly during this piston stroke. During the power stroke, both valves are closed. The high pressure of expanding gases pushes the piston downward. The piston transmits this push through the connecting rod to the crankshaft, making the latter perform mechanical work.

4th Stroke-Exhaust. The exhaust valve opens to release the burnt gases under an excessive pressure. The piston then moves upwards again and pushes all of the exhaust gas from the cylinder. Finally, the exhaust valve closes and the intake valve opens. The piston then moves downward once more on another intake stroke, and the cycle of events in the cylinder is then repeated.

Text D

Alternative Energy and Its Sources

Energy is the ability to do work. Alternative energy refers to energy sources which are not based on the burning of fossil fuels or the splitting of atoms. Fortunately there are many means of harnessing energy which have less damaging impacts on our environment. Here are some possible alternatives:

- solar;
- wind power;
- geothermal;
- tides;
- hydroelectric.

Solar energy is one the most resourceful sources of energy for the future. One of the reasons for this is that the total energy we receive each year from the sun is around 35,000 times the total energy used by man. Solar energy is presently being used on a smaller scale in furnaces

for homes and to heat up swimming pools. On a larger scale use, solar energy could be used to run cars, power plants, and space ships.

Wind power is another alternative energy source that could be used without producing by-products that are harmful to nature. Like solar power, harnessing the wind is highly dependent upon weather and location.

The fins of a windmill rotate in a vertical plane which is kept perpendicular to the wind by means of a tail fin. As wind flow crosses the blades of the windmill, it is forced to rotate and can be used to generate electricity.

Geothermal energy is an alternative energy source, although it is not resourceful enough to replace more than a minor amount of the future's energy needs. Geothermal energy is obtained from the internal heat of the planet and can be used to generate steam to run a steam turbine. This in turn generates electricity, which is a very useful form of energy.

Even the power of the tides can be harnessed to produce electricity. Similar to the more conventional hydroelectric dams, the tidal process utilizes the natural motion of the tides to fill reservoirs, which are then slowly discharged through electricity-producing turbines.

Hydroelectricity comes from the damming of rivers and utilizing the potential energy stored in the water. As the water stored behind a dam is released at high pressure, its kinetic energy is transferred onto turbine blades and used to generate electricity.

UNIT VI

Грамматические основы перевода, упражнения.

- Перевод причастий.
- Многофункциональные служебные слова и их перевод.

Лексические основы перевода, упражнения.

- Перевод интернациональных слов.
- Перевод прилагательных с суффиксами *-y, -al, -ic, -ical, -ous, -ious*.
- Перевод терминов типа «существительное + причастие II + существительное».

Текст А. Tools Used in Logging.

Текст В. Wood for Woodworking.

Текст С. Working Cycle of the Four-Stroke Carburettor Engine.

Текст D. Wave Power.

GRAMMAR EXERCISES

Ex. 1. Define the Participle in the following sentences, translate them:

1. Quantities frequently measured include time, length, area, volume, pressure, mass, force, and energy. 2. To express a measurement, there must be a basic unit of the quantity involved. 3. Accuracy is determined by the care taken by the person making the measurement and the condition of the instrument. 4. The choice of the instrument used should be appropriate to the desired precision of the results. 5. The force of gravitational attraction exerted on a body by the earth known as the weight of the body is one of the most important forces in everyday life. 6. The modern war is an all-round test of the material and spiritual strength of every nation involved. 7. The efficiency of a machine is determined by the ratio of the useful work performed to the total work expended. 8. Capacity is the property of two electrical conductors, when separated by insulation, to receive and retain electricity.

Ex. 2. *Define Participle I in the following sentences and translate them:*

1. They spend the whole day packing the equipment. 2. They experimented with the device, not knowing that it was out of order. 3. He wasted a lot of time, looking for his missing glasses. 4. Using this new method, he solved a number of problems. 5. Seeing nothing that could interest us, we left the exhibition. 6. She rushed back home, suddenly remembering that she had not locked the door. 7. The man speaking to the students is the Head of the Department. 8. The article, being typed now, will be published tomorrow. 9. All the roads leading to the center of the city were blocked by trucks. 10. The child was frightened by an approaching train. 11. Being unable to help, I went home. 12. Having completed their tests, the students handed them in. 13. Having spent all the money he started looking for work.

Ex. 3. *Study the following sentences and point out the differences in their translation:*

1. A. A car running on hydrogen was invented long ago.
B. Running on hydrogen this car is not likely to cause pollution.

2. A. Students attending classes regularly study better.
B. Attending classes regularly students understand the material quicker.

3. A. The exhaust system being repaired at the moment produces too much smoke. B. Being repaired by a skillful mechanic the exhaust system is now in order. C. If not repaired the exhaust system will have to be replaced.

4. A. When redesigned the engine will perform better. B. Being redesigned completely the engine became more efficient. C. The engine redesigned and improved by the researchers showed excellent performance.

Ex. 4. *Translate the following sentences into Russian:*

1. Only scientific theory can ensure practical achievements. 2. We now know that the atom is divisible. 3. The electric current flows in the circuit only after it is closed. 4. The only resistance in this case is the internal resistance of the cell. 5. The movement of a jet plane is so swift that the eye can follow its flight only with difficulty. 6. Unlike uranium, oxygen is a very light element. 7. Since the weight of a body is a force, it must be expressed in force units. 8. The boiling stopped and the liquid became still. 9. We could not see the ships as they were hidden by a dense fog. 10. A great amount of energy liberates after the atomic burst. 11. The Centigrade temperature scale is the only scale used in most countries. 12. All planes but one returned from the flight. 13. We like all kinds of sport. 14. Unlike Sofia a city of straight avenues, Bucharest has many winding streets.

Ex. 5. *Translate into Russian:*

1. A transformer cannot be called a machine, for it has no moving parts. 2. In radar, unlike in communication, the transmitter and the receiver are located at the same place. 3. Perpetuum mobile is but a naive dream of the ancient people. 4. As the radio wave travels through the space, the electromagnetic part of its energy rapidly drops in strength. 5. Unlike the previous engines that relied only on one operating cylinder, Watt's engine had two and operated with the flow of heat between the two cylinders. 6. As the exhaustion of fossil fuels became notable, scientists began to seek for an alternative source of energy. 7. The invention of the internal combustion engine was a big relief for the oil companies since petroleum was not a preferred automobile fuel. 8. Since one half of the material of the earth's crust is oxygen, its compounds are very common. 9. The sun is not the only source of energy, for there are unlimited reserves of energy in the atoms of various chemical elements. 10. As the mass number, i.e. the sum of the neutrons and protons, increases, the neutron-to-proton ratio for stability increases.

LEXICAL EXERCISES

Ex. 6. *Translate the following international words into Russian:*

radar, object, echo, character, pulse, portion, azimuth, transistor, transformation, photo, revolution, radioactive, react, instrument, nickel, vertical, panel, microphone, type, diaphragm, cosmos, card, planet, instruction, analog, organization, manipulate, arithmetic, logic, disk, modem, imitate, synthesis, structure, period, practice, organic, cyclone, ventilation, diffusion, biology, civilization, aspect, electrolysis, negative, cybernetics, airport, telegram, storm, complex, statistics, critical, rocket.

Ex. 7. *Form adjectives using the suffixes and translate them into Russian:*

- y: grain, sleep, sun, hill, wind;
- al: physics, nature, norm, mechanics, idea, proportion;
- ic: system, metre, atmosphere, period, atom;
- ical: philosophy, identity, symmetry, geometry;
- ous: danger, continue;
- ious: space, vary.

Ex. 8. Translate the following terms (*noun + Participle II + noun*) into Russian:

- | | |
|------------------------------|--------------------------|
| 1. disc-shaped tool | 6. centre-pivoted axle |
| 2. spring-loaded valve | 7. rubber-jointed track |
| 3. liquid-cooled engine | 8. spring-assisted lever |
| 4. tractor-mounted equipment | 9. cam-operated plunger |
| 5. power-driven axle | 10. relief-loaded jack |

Text A

Tools Used in Logging

Tools and equipment used in logging are characterized by strength, durability and efficiency for the work to be done. The main tools are: wedges, axes, cant hooks, tongs, chokers, chains, saws.

Wedges. Fellers and buckers require wedges to aid them in directing the fall of the trees and to prevent the binding of the saw in the cut. They are useful in felling trees to make them land where the feller desires and they are extremely helpful in splitting wood. For use with crosscut saws, felling and bucking wedges are made of wood, steel and iron. Hardwood wedges are usually used by crews cutting softwoods and steel wedges by those cutting hardwoods. Splitting wedges are used to split wood. Splitting wedges are considerably bigger than felling and bucking wedges. The wedges are made of various weights, generally 2 lb. or more, and in various lengths. Various types of wedges are used, depending on the size and species of timber. Metal wedges of steel and iron up to 12" long and 3" wide and weighing up to 9 lb. are used in big timber. Felling wedges, especially when used in large timber, are longer than those used for bucking.

Axes. Axes are used for making undercuts in felling, for limbing and bucking. There are several types of axes: double-bitted axes and single-bitted axes. The head may have one or two cutting edges.

Cant hooks. Cant hooks are used largely for rolling logs from one place to another. Logs can be rolled out from behind stumps or other obstructions for skidding. A variation of the cant hook, for use in the woods, is the log jack. With this tool a small pole even a tree length can be grasped and rolled up on the rocker for bucking.

Tongs. Tongs are used in skidding and loading logs. They vary in size and weight with the logs to be handled.

Chokers. A choker is a chain from 12 to 16 ft. long made of iron with or without a hook at the end. Chokers are used in skidding long lengths.

Chains. Chains are used in skidding, trailing and chaining logs, in rafting and booming logs, and for many miscellaneous jobs about a logging operation.

Text B

Wood for Woodworking

Woodworkers classify wood as hardwood or softwood, depending on the type of tree from which it comes. Most hardwood trees are deciduous – that is, they lose their leaves every autumn. Most softwood, or coniferous, trees have narrow, pointed leaves and stay green the year around. This classification system does not indicate the hardness of wood, because various softwoods are harder than some hardwoods. However, the two types of wood have other characteristics that are important to the woodworker.

Hardwoods have beautiful grain patterns and can be used to make fine furniture. Some hardwoods have large pores and must be treated with a paste or liquid called filler before being covered with a finish. Wood to be finished with paint does not need a fancy grain to be attractive because the paint covers the pattern. Hardwoods used in woodworking include birch, mahogany, maple, oak, and walnut.

Most softwoods can easily be sawed, planed, chiseled, or bored. They are used mainly for structural work, but such softwoods as Douglas-fir, ponderosa pine, red cedar, and white pine can be used for woodworking and furniture.

Hardwood or softwood can also be used to make a type of manufactured board called plywood. Plywood consists of an odd number of thin layers of wood glued together. It is lightweight and strong and can be purchased in many sizes and wood patterns.

Text C

Working Cycle of the Four-Stroke Carburettor Engine

As distinct from the diesel engine, in the carburettor engine, fuel and air enter the cylinder in the form of an air-fuel mixture prepared by the carburettor.

Each of the strokes in the working cycle of the four-stroke carburettor engine, as in the diesel engine, is characterized by the position of the valves and the direction of the piston travel. The cycle of operations of the four-stroke carburettor engine occurs as follows.

Intake – the piston moves downwards. The intake valve is open. As a result of a vacuum produced by the downward movement of the

piston, the air-fuel mixture prepared by the carburettor enters the cylinder through the open intake port and, intermingling with the unscavenged exhaust gases, forms the combustible charge.

Compression – the piston moves upwards. Both the intake and the exhaust valves are closed. The volume above the piston diminishes and the combustible charge is compressed, which facilitates the evaporation of gasoline vapour with air. By the end of the compression stroke, the pressure in the cylinder reaches 1 to 1.2 MPa and the temperature to 400° C.

Power – burning of fuel and expansion of combustion gases. Both valves are closed. At the end of the compression stroke, the combustible charge is ignited by a spark. The piston moves down under the pressure of expanding combustion gases. The pressure of the gases reaches 2.5 to 4 MPa and their temperature, 2000° C.

Exhaust – the piston moves upwards. The exhaust valve is open. The spent exhaust gases leave the cylinder through the exhaust port.

Diesel engines are more economical than their carburettor counterparts. As a result of their higher compression ration, the diesel engines burn 25% less fuel (per unit work done).

Diesel engines operate on heavy fuels that present less fire hazard in handling.

The diesels, however, feature some disadvantages:

- they are more bulky, for the high pressure of combustion gases in the cylinder requires stronger engine components;
- they are more difficult to start, especially in cold weather.

Text D

Wave Power

Ocean waves are caused by the wind as it blows across the sea. Waves are a powerful source of energy.

The problem is that it's not easy to harness this energy and convert it into electricity in large amounts. Thus, wave power stations are rare.

There are several methods of getting energy from waves, but one of the most effective works like a swimming pool wave machine in reverse.

At a swimming pool, air is blown in and out of a chamber beside the pool, which makes the water outside bob up and down, causing waves. At a wave power station, the waves arriving cause the water in the chamber to rise and fall, which means that air is forced in and out of the hole in the top of the chamber. We place a turbine in this hole, which is turned by the air rushing in and out. The turbine turns a generator. A problem with this design is that the rushing air can be very

noisy, unless a silencer is fitted to the turbine. The noise is not a huge problem anyway, as the waves make quite a bit of noise themselves. Once you've built it, the energy is free, needs no fuel and produces no waste or pollution. One big problem is that of building and anchoring something that can withstand the roughest conditions at sea, yet can generate a reasonable amount of power from small waves.

Advantages:

1. The energy is free - no fuel needed, no waste produced.
2. Not expensive to operate and maintain.
3. Can produce a great deal of energy.

Disadvantages:

1. Depends on the waves - sometimes you'll get loads of energy, sometimes nothing.
2. Needs a suitable site, where waves are consistently strong.
3. Some designs are noisy.
4. Must be able to withstand very rough weather.

Wave power is renewable.

UNIT VII

Грамматические основы перевода, упражнения.

- Перевод независимого причастного оборота.
- Местоимения-заместители существительного (*it, one, that*) и их перевод.

Лексические основы перевода, упражнения.

- Перевод интернациональных слов и «ложных друзей» переводчика.
- Перевод прилагательных с суффиксами *-less, -ful, -able, -ible, -ant, -ent*.
- Перевод терминов типа «существительное + причастие II + существительное».

Текст А. Mechanization of Logging Operations.

Текст В. Conventional Dry Kiln.

Текст С. Engine Lubrication System.

Текст D. Biomass Energy.

GRAMMAR EXERCISES

Ex. 1. *Translate the sentences into Russian. Determine the Absolute Participial Construction in them:*

1. Electroplating was invented in Russia, its inventor being Russian scientist Yacobi. 2. The bridge having been repaired, we were able to cross the river. 3. Electrons moving through a wire, electrical energy is generated. 4. The vapour pressure of a liquid becoming equal to atmospheric pressure, the liquid boils. 5. Water has a higher specific heat than most of other common substances, the specific heat of iron

being approximately one-ninth the heat of water. 6. Any moving object is able to do work, the quantity of kinetic energy depending on its mass and velocity. 7. The temperature of a wire being raised, the random motion of the electrons increases. 8. The current flow having been changed, the direction of the magnetic lines of force also changed. 9. The substance being a dielectric, no current can flow through it. 10. Gases are light substances, the lightest of them being hydrogen.

Ex. 2. *Translate into Russian paying special attention to the pronoun **it** and its functions:*

1. Little wonder **it** is that earlier cultures saw in thunderstorms the activities of gods. 2. When dealing with a gas **it** is common practice to consider **it** under a pressure of 1 atmosphere. 3. From the very earliest time **it** has been a favourite hypothesis that all matter is really composed of one substance. 4. In our case **it** is a usual procedure to heat the substance to a high temperature and then to quench **it**. 5. The law makes **it** easy to understand the relation of the two values. 6. Galileo's experiment made **it** clear that all bodies fall with the same acceleration. 7. The samples taken with the new apparatus make **it** possible to give geological and hydrological investigations a considerably greater accuracy. 8. Light molecules tend to find **it** harder to leave a hot region than to enter **it**. 9. While evaluating the automatic computers, **it** is very helpful to keep two basic facts in mind. 10. The complications mentioned make **it** difficult to make a comparison between the compounds in question.

Ex. 3. *Translate into Russian paying special attention to **one(s)**:*

1. The result, like the **one** just described, is in no way surprising. 2. An electron tends to collide with a molecule coming in the opposite direction rather than with **one** travelling in the same direction. 3. **One** should take the precautions mentioned. 4. **One** believes that the procedure described above will simplify the experiment. 5. **One** may well ask why the two sheets of paper fly apart. 6. It takes **one** much time to make all the necessary calculations. 7. The evidence provided by the author makes **one** believe that his hypothesis rests on sound foundation. 8. The figures presented involve **one** in the problems of modern statistics. 9. **One** is to make a lot of experiments to make sure that his observation is adequate. 10. The computer allows **one** to make calculations in a short time.

Ex. 4. *Translate into Russian paying special attention to **that** (**those**), **this** (**these**):*

1. The electron temperature is much greater than **that** of the gas as a whole. 2. Unlike molecules can be determined by methods like **those** used earlier for like molecules. 3. The diameter of Neptunium is four times greater than **that** of the Earth. 4. The atomic weight of

sulphur is twice as large as **that** of oxygen. 5. Suppose that the total volume of the gas is k times **that** of the molecule. 6. The technique used has some advantages over **that** suggested by our scientists. 7. Carbon dioxide cannot support life, its properties being different from **those** of the oxygen which it contains. 8. There are two methods of measuring the conductivity of semiconductors. The first of **these**, which is used more commonly, has a number of advantages.

Ex. 5. *Translate the following sentences:*

1. The most distant planets as well as the nearest ones are beyond the atmosphere of the earth. 2. The vegetation of valleys is richer than that of mountains. 3. Every useful object such as iron, paper, etc., may be regarded from a twofold outlook, that of quality and that of quantity. 4. This motherboard is much better than the one you showed me last time. 5. When boiling point is reached, the heat necessary to convert the water into steam is latent one and cannot be measured by the thermometer. 6. It is the sun that steadily sends out a great amount of radiant energy. 7. It is the steam turbine that has replaced the old reciprocating engine. 8. On a physical map one can see seas, rivers and mountains. 9. The engine stopped; it was badly damaged. 10. One can still see Magellan's ship in Spain exhibited ashore in memory of the first journey around the world. 11. One could hardly expect such a turn of circumstances. 12. It was formerly believed that all heavy objects fell faster than light objects.

LEXICAL EXERCISES

Ex. 6. *Translate the following international words and "pseudo friends" of the translator:*

guarantee, distance, programme, orbit, basis, culture, genial, region, polymer, list, radio, organic, mark, material, crystal, production, replica, contrast, medicine, nation, tax, laboratory, company, idealist, resin, chemistry, financial, translate, computer, energy, fantasy, accurate, enthusiast, atom, television, conductor, alphabet, model, telegraph, lamp, gallant, technology, profession.

Ex. 7. *Form adjectives using the suffixes and translate them into Russian:*

-less: hope, use, weight, motion, power;
-ful: use, thank, meaning, wonder, beauty;
-able: change, compare, measure, sustain, predict;
-ible: exhaust, convert, access, vision;
-ant: resist, radiance, import;
-ent: differ, appear.

Ex. 8. *Translate the following terms (noun + Participle II + noun) into Russian.*

1. foot-operated brake 6. programme-controlled tool

- | | |
|--------------------------|----------------------------|
| 2. air-filled tyre | 7. motor-propelled vehicle |
| 3. rear controlled axle | 8. pin-jointed track |
| 4. engine driven pump | 9. radio-controlled bomb |
| 5. rubber-insulated bolt | 10. hand-operated device |

Text A

Mechanization of Logging Operations

The introduction of the chainsaw and the mechanization of logging operations in industrial forestry have resulted in great changes of productivity and working conditions. The extensive mechanization and rationalization involved a radical decrease of the number of forest workers, and the occasional forest job changed to a full-time profession. The chainsaw has been replaced by the harvester, a one-man technically sophisticated off-road machine, used for felling, delimiting, and crosscutting in one continuous operation, and also for final felling and thinning. The degree of utilization, per day and per year, is high. An average machine system consisting of a team of 4 to 5 operators in shift with one harvester and one forwarder produces some 40,000 m³ per year. In this advanced and expensive man/machine system the operator is sitting in the comfortable cab, designed according to ergonomic standards, activating the felling of trees with light movements of his fingers on the controls. The forest worker's heavy job has changed into a physically light, sedentary work, mentally demanding and with high economic pressure.

Simultaneously with the increasing mechanization in forestry, large-scale programs were undertaken to develop and improve the motor-manual work with chainsaws. To fell trees is a difficult and dangerous operation which requires adequate tools, training, and experience. The falling tree involves high, unpredictable forces. The chainsaw, with its unprotected chain running at a speed of some 20 m/sec, is a potentially dangerous tool.

Chainsaws continue to be widely used in private forestry, however, by self-employed woodlot owners and occasional wood cutters. The non-professional wood cutters with chainsaws, who are working on a self-employed basis without the support of any company safety organization and for very short working times of only some days or a couple of weeks per year, are exposed to high accident risks .

Text B

Conventional Dry Kiln

Advantages:

- the kiln chambers with a capacity of 25 - 200 m³;
- fully automatic control;

- specially cast aluminum ventilators are reversible, engines designed for heavy duty;
- possibility for side and front loading;
- building options: all aluminum, aluminum frame with stainless steel interior panels;
- precise temperature and humidity control.

Timber drying kilns are enabled to dry all sort of timber and provide optimum drying conditions for all lumber grades and markets. Conventional kiln buildings are very well insulated and are absolutely vapor tight. A modern computer controls the whole process and according to the need of the client drying programs could be customized or some new programs could be added.

Conventional method is used: the air in the kiln is heated and circulates through the stacked lumber by the fans. The air will slowly rise in relative humidity and temperature. When the desired temperature and relative humidity is reached, depending on the kind of lumber you dry, the computer will open the modulating ventilation system. An amount of hot wet air will be vented to the outside. The same amount of fresh outside air will enter the kiln; this air is heated and is also able to absorb moisture from the lumber again.

In this way, the relative humidity and moisture content of the lumber will be reduced till the desired moisture content in the lumber is reached. According this timber will be free of internal stress, hogging and cracks.

Air removal system includes air-exhauster and admission valve.

Internal heat exchanger: includes water heat exchanger, system of pipeline and some special heat exchangers.

Air circulation. Reversible fans set up on the top above false ceiling. Blades are made of aluminum; angle of blades is adjustable. Motors works at 90°C and 100% of moisture.

Heating system. Heat-transfer is hot water, superheated water or steam. Heat exchangers are made out of bimetallic pipes: stainless steel or copper with aluminum fining. Heat exchangers are supplied with connective collectors with flanges for further connection to external hydraulic system.

Text C

Engine Lubrication System

The purpose of lubrication is to reduce the friction between moving surfaces. If parts rubbing on each other are not separated by a film of lubricant, the surface will rub rapidly and wear away. Friction is a force that tends to retard or to stop motion of one surface over another. The frictional force depends on the nature of the surface, and

also on the kind of the material. The rougher the surface and the softer the material, the greater the friction; while the harder the material and the smoother the surface the less the friction. The more friction there is, the greater the loss of power, as it requires power to overcome friction.

A great amount of friction is necessary in certain parts of the car such as in the brakes, the clutch, and the outer surface of the tires in order that they be efficient. On the other hand, it is essential that all friction possible be eliminated from the bearings and pistons in order to have as little of the engine power lost as possible. It is impossible to eliminate the friction entirely, but with the proper use of suitable lubricants, the loss due to friction can be reduced to a minimum. The principal parts of the engine needing lubrication in order to prevent friction are the main crankshaft bearings, connecting-rod bearing pins, camshaft bearings, piston, and cylinder walls.

Lubrication requirements. Bearing surfaces of high speed machinery must always be kept well lubricated, in order that the friction motion at these surfaces may be low. In combustion engines, oil must be fed to all of the bearing surface continuously while the engine is running, in adequate quantity, yet it must not be supplied in excess to the cylinder walls, as the suction due to the partial vacuum in the cylinder during the inlet stroke tends to draw it up into the combustion chambers, and if too much is fed the exhaust will be smoky with oil vapour, and carbon deposits will form on combustion chamber walls. For engine lubrication, mineral or petroleum oil is used almost exclusively.

Text D

Biomass Energy

Biomass is one of the oldest and most well-established energy sources in the world. Biomass is simply the conversion of stored energy in plants into energy that we can use. Thus, burning wood is a method of producing biomass energy.

If the burning of wood were the only biomass application, then that field of study would not be nearly as interesting as it is. In fact, biomass has many possibilities as a renewable energy source. High energy crops grown specifically to be used as fuel are being developed, and scientists are beginning to consider agricultural and animal waste products as possible fuel sources.

Biomass is energy produced from organic substances. The key to the power of biomass lies in the energy of the sun. All plants undergo a process called photosynthesis, whereby the plants use chlorophyll to convert the energy in the sun's rays into stored energy in the plants.

Photosynthesis, water, and nutrients in the soil are the ingredients of plant growth.

There are several methods of converting biomass into energy. These methods include burning, alcohol fermentation, pyrolysis, and anaerobic digestion.

Direct burning of biomass is the most straightforward method of energy production. Mankind has burned wood and other forms of biomass for thousands of years, to keep warm, to cook food, and eventually to forge weapons and other tools.

The energy released by direct combustion takes the form of heat, and can be used to directly influence the temperature of a small environment or to power steam-driven turbines to produce electricity. Unfortunately, the burning of biomass is the cause of a great deal of pollution and has contributed to the so-called "greenhouse effect" and global warming.

A relatively new field of research is the development of high energy crops specifically designed to be burned for power generation. Because at most only about 5% of a plant's mass is edible, the potential for large-scale biomass production is relatively great.

UNIT VIII

Грамматические основы перевода, упражнения.

- Перевод герундия.
- Передача артикля при переводе.

Лексические основы перевода, упражнения.

- Перевод неологизмов.
- Перевод прилагательных и наречий с суффиксами *-ive, -ary, -ful, -less, -ly*.
- Перевод слов с префиксами *re-, sub-, inter-*.
- Перевод терминов типа «прилагательное (наречие) + существительное + существительное».

Текст А. Logging Machinery of the Future.

Текст В. Varnish – an Almost Ideal Finish.

Текст С. Planers.

Текст D. Energy Management: Renewable Energy Sources.

GRAMMAR EXERCISES

Ex. 1. *Determine the Gerund in the following sentences. Translate them into Russian:*

1. Measuring resistance is necessary in many experiments.
2. Falling is a case of motion at constant acceleration.
3. Dividing the total charge by the number of ions in the cloud gives the charge of each ion.
4. Heating copper wire from 0 to 100° increases its resistance about 40%.
5. It is worth while discussing this phenomenon.
6. There is one

more point worth mentioning. 7. It is no use searching for another approach. 8. It is no good arguing about this issue. 9. The motor went on running. 10. We cannot help acknowledging the importance of this statement. 11. Would you mind answering one more question? 12. In spite of his words I could not help feeling excited.

Ex. 2. *Translate the sentences below paying attention to the Gerund and its functions:*

1. Discussing a problem with colleagues is always helpful. 2. I suggest holding another meeting next week. 3. Some people prefer listening to somebody else's opinion to forming their own. 4. The old equipment badly needed repairing. 5. He avoided making public statements. 6. In spite of difficulties he kept on performing his experiments. 7. They were prevented from finishing their work in time. 8. Nowadays you can't work out a new theory without discussing it with other people. 9. They are proud of having completed their job. 10. He is good at solving mathematical problems.

Ex. 3. *Translate the sentences into Russian:*

1. A new frame, aimed at reducing drag by having the minimum frontal area, has been built. 2. This car is unusual in having a single disc brake at the rear. 3. All tractor engines are alike in being internal combustion engines. 4. The development continues to be aimed at producing still greater power. 5. In designing the machine certain calculations had to be made. 6. The company is to be congratulated on having produced a practical gas turbine engine for a motor car. 7. By far the most experience in fabricating all-aluminium radiators has been with brazed assemblies. 8. The desirable aim is maintaining a given viscosity over working range of temperature.

Ex. 4. *Insert articles where necessary and comment on their use. Translate the sentences:*

1. ... postman's little boy says that he'd rather be ... dentist than ... doctor, because ... dentists don't get called out at ... night. 2. Just as ... air hostess (there was only one on the plane) was handing me ... cup of ... coffee ... plane gave ... lurch and ... coffee went all over ... person on ... other side of... gangway. 3. There was ... collision between ... car and ... cyclist at ... crossroads near ... my house early in ... morning. ... cyclist was taken to ... hospital with ... concussion. ... driver of ... car was treated for ... shock. ... witnesses say that ... car was going at ... seventy miles ... hour. 4. Peter Piper, ... student in ... professor's college, asked him why he refused to talk to ... press. 5. – We're going to ... tea with ... Smiths today, aren't we? Shall we take ...car? – We can go by ... car if you wash ... car first. We can't go to ... Mrs. Smith's in ... car all covered with ... mud. 6. He got ... job in ... south and spent ... next two years doing ... work he really enjoyed. 7. It is ... pleasure to do ...

business with such ... efficient organization. 8. ... day after ... day passed without ... news, and we began to lose ... hope. 9. – Would you like to hear ... story about ... Englishman, ... Irishman and ... Scotsman? – No. I've heard ... stories about ... Englishmen, ... Irishmen and ... Scotsmen before and they are all... same. 10. – But mine is not ... typical story. In my story ... Scotsman is generous, ... Irishman is logical and ... Englishman is romantic. – Oh, if it's ... fantastic story I'll listen with ... pleasure. 11. ... apples are sold by ... pound. These are forty pence ... pound.

Ex. 5. *Insert articles where necessary in stable expressions. Translate the sentences:*

1. He is always in ... hurry. 2. She reads English books in ... original. 3. My mother keeps ... house. 4. This little boy always tells ... truth. 5. It's ... pity I can't sew. 6. This excursion is out of ... question. 7. She is at ... work now. 8. On ... one hand she is very smart, on ... other hand she has few friends. 9. One can do different kinds of work at ... time. 10. I saw him ... other day. 11. He fell in love with her at ... first sight. 12. I usually go to the University on ... foot. 13. They sat ... side by ... side at the table. 14. He always speaks in ... low voice. 15. In summer pupils have ... lot of free time.

LEXICAL EXERCISES

Ex. 6. *Translate the following sentences without a dictionary:*

1. **Prefabs** are generally used instead of conventional building material when rapid erection of houses is required. 2. A big four-decked merchantman was **shored** by a heavy storm a few days ago off the Cape Horn. 3. Both A-bomb and H-bomb are the weapons of mass destruction and therefore we insist on stopping all **A-tests** and **H-tests**. 4. It was a handsome man; he **clerked** at some forwarding department and **roomed** a very small lodging not far from his office. 5. Nadya Pryakhina, a well-known chute jumper, is particularly keen on delayed jumps; today she has made her second **delay-drop** of 15 seconds. 6. London busmen went on strike demanding the 15 **shillings-a-week** increase of pay. 7. Several leaders of the strike were **clubbed** and then **questionized** at the police station. 8. Scientists developed new weapons for aircraft, particularly **air-to-air** and **air-to-surface** atomic missiles. 9. Before World War II distinct signs of **westernisation** were clearly visible in the educational system of India.

Ex. 7. *Form adjectives and adverbs using the suffixes and translate them into Russian:*

a) adjectives:

-ive: effect, interact, progress, expense, decision;

-ary: element, station, imagine;

-ful: doubt, peace, success, respect;

-less: home, meaning, use, shape, care;

b) adverbs:

-ly: equal, exact, final, rough, comparative, similar, hard, large.

Ex. 8. *Form words using the prefixes and translate them:*

re-: to use, to construct, to build, to name, production, to form, to adjust;

sub-: to divide, station, way, group, conscious, normal;

inter-: to act, to mix, connection, relation, change.

Ex. 9. *Translate the terms which are composed of adjective*

(adverb) + noun + noun:

- | | |
|------------------------------|--------------------------|
| 1. full-load pressure | 6. pressed-steel channel |
| 2. low-cost fuel | 7. heavy-duty truck |
| 3. single-stage compressor | 8. high-speed engine |
| 4. high efficiency generator | 9. multiple-disc clutch |
| 5. single-axle trailer | 10. small-diameter wheel |

Text A

Logging Machinery of the Future

Although harvesters and forwarders have a rather long period of development behind them, they are still in the stage of development. Power transmission systems, computerised bucking and control systems, and some other ergonomic features, for example, are being developed intensively. Many other smaller improvements in the machines are designed annually. Special machines, such as small-size harvesters and forwarders, multi-stem-processing in harvesters, combined harvester and forwarder for thinnings are already on the markets. Possible futures include special machines for thinnings and for wood harvesting. Although walking machines may be an alternative only for use in special conditions (mountains), technical innovation to minimize the slip of tyres, to decrease ground pressure, to grade the timber assortment more effectively, to automate some work elements, to support the maintenance and repair of machines by computerized systems and to improve the quality of timber may be a reality in near future. Information ergonomics may provide us the way to find the right division of work between a computer and an operator.

The maintenance and repair of machines may still benefit from technical development, such as automated or central greasing and lubrication, and automated, preventative indicating of defects. Also, first steps have been taken to build computerized expert systems to support the repair work. At paper mills an operator or a service man may already be equipped with a small video camera in the helmet and his activities are supported in real time by experts via telemetric

systems. The main emphasis in long-distance transport will be on truck transport. Bundle floating, barge transport and railway transport are still valid methods but their proportion is not very big. GIS are widely used in operational control together with computerized models. More effective use of return trip loads and trucks capable of transporting several materials (timber, chips, peat, etc) is one possible direction of development.

Text B

Varnish – an Almost Ideal Finish

All varnishes have one thing in common: The backbone of the finish molecule is composed of vegetable oil. Varnishes are made by chemically combining a modifying resin with a vegetable oil to produce a finish molecule that is liquid when applied to the wood surface but solid after it cures to an impervious film in a short period of time. Linseed oil and soybean oil are the most common vegetable oils used in the manufacture of furniture-grade varnish resins. Tung oil is also used. The type of oil used in a varnish resin has less effect on the finish properties than does the amount of oil used.

The ratio of oil to modifying resin – known as oil length – determines the flexibility of the dried film, curing or drying time and application method. Varnish resins containing 75% or more oil are called very long-oil varnishes. They dry slowly, have great wood penetration and are extremely flexible when cured; but the dried finish film is extremely soft, has poor abrasion resistance and damages easily. These varnishes perform adequately, provided that no detectable finish film is left on the surface of the wood.

Long-oil varnishes are 60% to 75% oil and are primarily used in the manufacture of oil-based paint but recently have been introduced to the wood-finishing arena as fast-dry wipe-on finishes.

Medium-oil varnishes contain 45% to 60% oil and form the basis of all brush-on varnishes used in wood finishing. They have reasonably short drying times, good abrasion and stain resistance, penetrate the wood to accentuate its beauty and form a hard but flexible protective surface film. Best of all, medium-oil varnishes can be applied by the three most commonly used methods: wiping, spraying or brushing.

Short-oil varnishes are less than 45% oil and typically require heat to cure, so they are not used for finishing wood. Short-oil varnish resins are used to make the paint for refrigerators, stoves and metal office furniture.

Text C

Planers

The planer is rigidly constructed and is especially suited for machining large work requiring long cuts. The operation of the planer may be considered as being the reverse of that of the shaper in that the reciprocating motion is produced by the worktable, while the cutting tool is made to feed at right angles to this motion to enable the cut to advance. As with most shapers, the planer cuts only on the forward stroke, after which the table is caused to make a quick return to bring the work into position for the next cut. The size of the planer is designated according to the size of the largest work its table will accommodate. Medium-size planers are used more commonly than other sizes, since they usually take work up to 20 feet long, and 4 S feet wide, and 3 S feet high. Planers large enough to machine castings up to 40 feet long, 20 feet wide, and 10 feet high are available.

There are two main types of planer – double-housing planer and one-housing planer.

Double-Housing Planers. Small planers have but one head for holding a cutting tool. In large planers, however, it is customary to have two heads on the crossrail, so that two tools may be cutting simultaneously, thus doubling the work capacity of the machine. The vertical feed of the tool on most planers is operated automatically, and, in a planer having two heads, both vertical and lateral feeds are independent of each other.

In the double-housing planer, the worktable moves between two vertical housings to which a crossrail and head are screwed. The table is driven by either a spur or helical gear which engages a rack attached to its underside. The larger machines are usually equipped with two cutting heads mounted to the crossrail as well as a side-head mounted on each housing. With this setup it is possible to machine simultaneously both the side and the top surfaces of a workpiece.

Open-Side Planers have but a single vertical housing, to which the crossrail is attached. The advantage of this design is that it permits the planing of work that is too wide to pass between the uprights of a double-housing machine.

Text D

Energy Management: Renewable Energy Resources

Once energy awareness, conservation, and efficiency measures have been employed, renewable energy sources should be investigated for providing the needed energy. Site conditions and available resources as well as energy demand will determine the sources to develop. Reliability and maintainability of conditions at the development are also important considerations. Energy systems should be decentralized, reliable, and locally maintainable.

Specific examples of renewable energy resources and their characteristics, applicability, advantages, and disadvantages are described below.

Solar Technologies. A broad range of solar technologies exists. Low technology systems are readily available to preheat water and dry foods. Medium temperature systems can provide refrigeration.

Swimming Pool Heaters. Swimming pool heaters are commonly manufactured of low-cost materials and are in the form of a simple piping loop with a circulator pump.

Domestic Hot Water Heaters. Domestic hot water heaters are systems used for providing potable hot water to household or commercial facilities. These systems are simple to install, and maintenance is low.

Photovoltaic Systems. Ample sunlight, low maintenance, high reliability, and widespread support make photovoltaic systems an attractive option for remote energy generation. System design is flexible and easily expanded.

Hydroactive Systems. Small-scale hydroplants are generally comprised of wheel generators that operate from low-head, running streams of water. They are reliable and cost-effective.

Wind Systems. As with solar technology, the simplest use of the prevailing winds is incorporation into the architecture. Wind generators can be a good choice for remote applications and small power demands such as pumping water.

Biogas Use. As a by-product of the anaerobic digestion of the solid waste stream, biogas offers the comprehensive benefits of waste and wastewater processing, methane production for cooking and refrigeration, and generation of organics for soil enhancement.

UNIT IX

Грамматические основы перевода, упражнения.

- Перевод герундиального оборота.
- Сослагательное наклонение и его перевод.

Лексические основы перевода, упражнения.

- Перевод интернациональных слов и «ложных друзей» переводчика.
- Перевод слов с префиксами *un-, in-, im-, il-, ir-, dis-, mis-*.
- Перевод терминов типа «наречие + причастие II (прилагательное) + существительное».

Текст А. Water Transportation of Logs.

Текст В. Finishing Cherry.

Текст С. General Design of Automobiles.

Текст D. Energy Efficiency.

GRAMMAR EXERCISES

Ex. 1. *Translate the sentences into Russian, pay attention to the Gerundial Constructions:*

1. The molecules of a polar substance because of their being reactive combine with one another. 2. Combustion may be incomplete owing to insufficient oxygen being present. 3. Thomson investigated the possibility of these cathode rays being charged particles. 4. Marie Curie's having discovered radium enabled her to isolate other radioactive elements. 5. Besides being important for industry oxygen is also important for medicine. 6. In addition to depending upon the acceleration, force also depends upon the mass of the object. 7. Oxygen is an active element of the atmosphere, and in addition to being essential for the maintenance of life it is also essential for combustion, the rusting of metals and the decay of organic matter.

Ex. 2. *Translate the sentences into Russian:*

1. Einstein's being awarded the Nobel prize in physics soon became widely known. 2. Dr. Blume's being appointed head of the Department was quite unexpected. 3. They objected to the data being published before all the experiments were completed. 4. We know of all substances consisting of atoms. 5. We insisted on their being offered favourable terms of payment. 6. The teacher insisted on my taking part in the conference. 7. We all regretted Professor Grey's having given only one lecture. 8. Would you mind my putting forward an alternative suggestion?

Ex. 3. *Use the proper form of the verb in brackets:*

1. If you (to give) me your address, I shall write you a letter. 2. If she (not to be) so absent-minded, she would be a much better student. 3. If they (not to go) to Moscow last year, they would not have heard that famous musician. 4. If you were not so careless about your health, you (to consult) the doctor. 5. I should be delighted if I (to have) such a beautiful fur coat. 6. If he (to work) hard, he would have achieved great progress. 7. I (to write) a composition long ago if you had not disturbed me. 8. If he is free tomorrow, he certainly (to come) to our party. 9. If my friend (to work) in my office, we should meet every day. 10. If you spoke English every day, you (to improve) your language skills. 11. If he (to come) to our house yesterday, he would have met his friend. 12. If he (not to pass) his examination, he will not get a scholarship.

Ex. 4. *Translate the sentences. Pay attention to the form of the Subjunctive Mood:*

1. If the model fits well, the observed data will be correct. 2. One will easily calculate the volume, if he knows the dimensions of the body. 3. If life existed on Venus, we should know this. 4. Unless computer techniques had been developed, space research would never

have made such great progress. 5. If the life had come to the so-called equilibrium, it would never have progressed beyond the amoeba. 6. A valuable contribution would be made, if considerable efforts were devoted to the theoretic examination. 7. Unless the widening were small, this spectrum would not be very faint compared with others. 8. I should give you a lot of examples without any difficulty. 9. It is necessary that atomic energy should be used for industrial purposes. 10. Magnetism is very often treated as if it were a subject as fundamental as electricity. 11. It is necessary that this phenomenon should be studied. 12. It is essential that the basic principles of these methods should be the same. 13. Without the force of gravitation there would be no pressure in liquids. 14. Were one electron removed, a net positive charge would be left. 15. Should your work meet these conditions, it will be of great service to our industry.

LEXICAL EXERCISES

Ex. 5. *Translate the following international words and “false friends” of the translator:*

degradation, thermodynamics, molecule, transformation, contribution, energy, family, proportion, component, line, station, type, intelligence, product, electronics, tradition, inspect, robot, pilot, control, telephone, number, statistical, inertia, phenomenon, experiment, elastic, system, potassium, analysis, solid, theory, vacuum, prospect, matrix, situation, scandal, dynamics, data, central, motor, economy, cartoon, hydraulics, test, structure, position, fabric.

Ex. 6. *Form words using the prefixes and translate them:*

un-: desirable, natural, limited, able, important;
in-: correct, visible, dependent, effective, accurate;
im-: pure, possible, patient, movable, perfect;
il-: legal, logical, literate, liquid, liberal;
ir-: regular, respective, responsible, relevant, removable;
dis-: charge, connect, advantage, like, continue, appear;
mis-: understand, information, use, lead, pronounce.

Ex. 7. *Translate the terms which are composed of adverb + participle II (adjective) + noun:*

1. rigidly mounted wheel
2. hydraulically operated blade
3. electronically controlled filter
4. substantially constant load
5. fairly light flywheel
6. substantially flat disc
7. automatically produced effect
8. positively charged particle
9. remotely controlled machine

10. circularly corrugated copper tube

Text A

Water Transportation of Logs

There are several types of water transportation: driving, floating, and a combination of driving and floating. Driving means the process of transporting logs in loose aggregation. Floating means the process of transporting logs by floats. Driving and a combination of driving and floating are possible on small streams; floating is possible on large streams. The efficiency of driving and floating depends on many factors: the size and depth of the stream, the character of the banks, the rate of flow, water supply, a down grade of the stream, and the improvements of the stream.

Although floating and driving are the cheapest forms of log transportation, they have many disadvantages. Water transportation suffers from a long seasonal pause because of shallowness of many streams during late summer. Floating and driving are adapted only to floatable species and to relatively small short logs. Only short logs can be successfully floated or driven. In streams which have been driven for years the stream bottoms contain many sunken logs. This is very harmful for navigation. There are numerous methods used in raising logs, but all these methods are not cheap from the economical point of view. The availability of good drivable streams, swift current, floatable species make many streams suitable for stream driving.

The drive proceeds in several steps. First the logs are hauled from the woods to stream banks during winter and yarded in piles. In spring logs, crossties, pulpwood, or other material are rolled into the water. Various types of dams, rollways, booms, and sluiceways are employed to put the drive through in the shortest length of time and with least expense.

Text B

Finishing Cherry

Cherry has been one of the most popular furniture woods for the past two hundred years. It is one of the easiest hardwoods to work with either hand, machine or power tools and has a nice smell when cut.

Another reason for its popularity is that it darkens and develops a beautiful deep red patina over time.

When cherry is freshly cut, milled into boards and dried, it has a very light pinkish colour. The colour also varies, sometimes even within the same board. It is only after a number of years that it starts to develop its deep red colour.

About 50 years ago cherry furniture became very popular. One of the first problems the manufactures discovered was that when they tried to stain the cherry, it did not take stain very evenly. Instead of staining, they applied a toned finish.

Regardless of the materials or technique used, staining cherry is still difficult. The highly figured swirl grain often seen in cherry is what makes it difficult to accept stain evenly. The grain density in this swirl figure varies from soft to hard, therefore the soft areas will soak up a stain while the hard areas will not make the stain penetrate well. The end result is a blotchy, uneven colour.

Even if you are successful in achieving a uniform deep red color, it will not last. As the cherry naturally ages, it will become darker and eventually, the colour may be too dark due to the stain and the natural darkening.

When staining a wood like cherry that does not take stain evenly, it's best to use a stain that is heavy in pigment. Pigmented stains are more resistant to ultra violet light than dyes are. Therefore, the chance of the wood becoming too dark over time is reduced. The best type of pigmented stain for woods that don't take stain evenly is a gel stain.

Adding colour to the topcoat finish is another way to decrease the amount of splotching in cherry. In addition to adding colour, you can also use a satin topcoat and rub it out after the last coat has cured. This will produce a finish that is not only more uniform in colour but also in sheen.

Text C

General Design of Automobiles

The automobile (car or truck) is a self-propelled (motor) vehicle intended for transporting goods and/or people and for carrying out special tasks.

As to purpose, motor vehicles are divided into transport vehicles, special-purpose vehicles, and competition vehicles.

Transport vehicles are classed in several types:

- a) cars – motor vehicles intended for carrying small groups of people (up to eight in number);
- b) buses – passenger service vehicles designed for carrying large groups of people (more than eight in number);
- c) trucks – motor vehicles intended for carrying various cargoes.

According to cargo (load-carrying) capacity trucks are in turn divided into the following classes: pick-up trucks (up to 0.5 t), light trucks (from 1 to 2 t), medium trucks (from 2 to 5 t), heavy trucks (from 5 to 15 t), and overweight trucks (more than 15 t).

Trucks used to carry loose and sticky goods are equipped with tipping bodies and are referred to as dump trucks.

Special-purpose vehicles, as their name implies, are intended for special work and are equipped accordingly. This group includes truck cranes, tank trucks, seed-filler trucks, etc. These are modifications of standard transport vehicle models.

Competition vehicles are cars specially designed for racing.

As to the type of chassis, motor vehicles may be rather framed or frameless.

Framed vehicles have a support structure, called frame, to which all the component parts of the vehicle are attached.

Frameless (unit-construction) vehicles have no frame, and all their component parts are attached directly to the vehicle body. The body in this case is referred to as unitized.

As to the prime mover, automobiles may be powered by carburettor engines, diesel engines, or electric motors.

Carburettor engines operate mainly on gasoline (petrol), diesel engines run on diesel fuel, and electric motors are supplied from storage batteries. Accordingly, automobiles are divided into gasoline-powered, diesel-powered, and battery-powered types.

Text D

Energy Efficiency

Efficient methods, devices, and appliances should be employed at the sustainable development to conserve energy. Almost all facets of the development and visitor services and amenities can profit from recent innovations in energy efficiency.

As an example, no bulb is cheaper to buy and more expensive to use than an incandescent bulb. Over 90% of the energy consumed by most incandescent lamps is released as heat. The substitution of one compact fluorescent bulb for an incandescent bulb will save a barrel of oil (money), keep about 2,000 pounds of carbon dioxide (global warming), and 20 pounds of sulphur oxides (acid rain) out of the atmosphere. For the owner, each \$10 compact fluorescent bulb will save approximately \$40 in energy cost over the life of the bulb. The 100-year-old incandescent bulb will soon go the way of the oil lamp.

Lighting. Natural lighting should be used wherever possible. The quality and ambiance of natural lighting are unsurpassed and it is free. Lighting design should be based on standards of reduced general lighting with task lighting and highlighting for specific functional considerations.

Where artificial light is needed, regular and compact fluorescent lighting should be used. Fluorescents are greatly improved with colour

rendition comparable to incandescents and electronic ballasts to totally eliminate perceptible flicker. They use 75% less electricity. Average life is 10 times longer than incandescents, reducing maintenance and transportation costs. In most circumstances, the economic payback for new fluorescents is under two years. The environmental payback is immediate.

UNIT X

Грамматические основы перевода, упражнения.

- Отглагольное существительное и его перевод.
- Перевод неличных форм глагола (повторение).

Лексические основы перевода, упражнения.

- Перевод сокращений.
- Перевод слов с префиксами *trans-*, *non-*, *de-*, *pre-*.

Текст А. Tractors in Logging.

Текст В. Finishing Wood Furniture.

Текст С. Sun-Driven Engine.

Текст D. Energy Management.

GRAMMAR EXERCISES

Ex. 1. *Define the verbal noun in the following sentences and translate them into Russian:*

1. The escalating of organic fuel use will be impossible soon. 2. When the boiling is reached the adding of heat does not raise the temperature. 3. I knew nothing about the recent happenings. 4. War causes hard sufferings. 5. The breaking of the circuit causes the magnetic field to disappear. 6. The conversion of heat into chemical energy is reversed when the burning of coal converts chemical energy into heat. 7. The reading of the advertisement might help you to find a job. 8. You may rely on the readings of the device. It is the best one in the group of high precision devices. 9. At the continued heating of a solid body the movement of its molecules becomes still faster. 10. The melting of copper requires a very high temperature. 11. The burning of a hydrocarbon fuel in air is an oxidation process pure and simple; it may be intensely rapid or it may be excessively slow. 12. Some manufacturers assist the cooling of the lubricant by providing a special oil radiator beside the water radiator. 13. The lever for changing the setting is placed within easy reach of the driver. 14. The two pedals make driving very simple.

Ex. 2. *Define the function of the V-ing form and translate the sentences into Russian:*

1. The proper work of an engine depends upon its being well lubricated. 2. All the chemical transformations that take place around us only change energy from one form into another without affecting the

total. 3. Coal and any other fuel provide the heat required for driving our engines and turbines. 4. In carrying out the plan of launching an artificial satellite our scientists had to solve many difficult problems. 5. The bridge having been repaired so quickly surprised us very much. 6. Before discussing this question they made a short break. 7. I knew nothing about the recent happenings. 8. Their having crossed the river caused a great surprise. 9. Knowing the volume, the pressure, and the temperature of the gas, we can determine the state of its mass. 10. The ammeter is a measuring device. 11. Having been detained by a snow storm, the liner was three days late. 12. I was told of their having been sent to the rescue operation.

Ex. 3. *Translate the sentences into Russian:*

1. Sometimes the cooling without the increasing of pressure results in liquefying the gas. 2. While teaching mathematics Tsiolkovsky continued his self-education studying astronomy, biology, and chemistry. 3. Stanyukovich distinguished himself as a gifted writer, most of his novels being connected with the sea. 4. The temperature having been raised, the vapour began forming again. 5. The air being shut off the fire, combustion stops. 6. Shipbuilding and fishing industries are widely developed in this part of the country. 7. At the age of 20 Tsiolkovsky began teaching; a profession at which he continued working for 40 years. 8. The splitting of atom liberates great quantities of energy. 9. Atomic energy is the foundation of all processes occurring in our universe. 10. Yellow sand having been used in manufacture, the glass had a yellowish colour. 11. Two bodies being placed in contact with each other, the temperature of the hot body falls while the temperature of the cold body rises. 12. The current in a circuit is decreased when the resistance is increased, other factors remaining the same.

LEXICAL EXERCISES

Ex. 4. *Translate the sentences. Pay attention to the abbreviations:*

1. A.C. is widely used in everyday life, e.g. for heating and lighting purposes. 2. Besides the so-called small cal., there is another much greater unit of heat i.e. the kilocalorie or kilogram calorie. 3. Most substances are known in at least three different states, viz.: a solid, a liquid, and a gaseous form. 4. We know many forms of energy, e.g. electrical energy, chemical energy, atomic energy, etc. 5. At the atm. press. of 14.7 lb. per sq. in., the temp. of the b.p. of water is 100°C., but the temp. increases with the press. 6. In 449 AD the British Isles were invaded and conquered by several German tribes. 7. H-bomb and A-bomb are the weapons of mass destruction. 8. U.K. war potential was greatly reduced as a result of the WWII. 9. We joined the UNESCO and

took active part in its work. 10. The first "baby-moon", i.e. the artificial earth satellite was successfully launched in the USSR in 1957.

Ex. 5. *Translate the sentences. Pay attention to the abbreviations:*

1. The USSR was the only Great Power in the UNO to support the demands of Egypt for the evacuation of UN troops. 2. The e.m.f. to be measured is relatively high. 3. We know the transformer to be an apparatus designed for changing the a.c. voltages and current by means of magnetic induction, the frequency remaining unchanged. 4. Despite the U.S. pressure only a very few countries have discontinued trading with the Iraq. 5. In the boiler the water is first heated to its b.p. and then vaporized, both processes taking place approximately at constant pressure. 6. Data issued by the U.S. Bureau of mines show that the coal output level in 1982 was the lowest in the last 15 years. 7. The amount of current a cell produces depends on the resistance this current must pass through and on the e.m.f. of the cell. 8. To find out the state of a given mass of a gas we have to know three things about it, viz.: its volume, its pressure, and its temperature. 9. As the mass number, i.e. the sum of the neutrons and protons, increases, the neutron-to-proton ratio for stability increases. 10. The number of cycles per second is the frequency of the a.c., the most common a. c. frequency being 50 c.p.s.

Ex. 6. *Form words using the prefixes and translate them:*

trans-: continental, form, Atlantic, figure;
non-: standard, conventional, durable, essential;
de-: compose, energize, magnetize, modulate;
pre-: determine, fabricate, diffusion, discovery.

Text A

Tractors in Logging

Tractors are universal tools which are widely used in the timber industry. By reason of their maneuverability and adaptability to a wide range of topographical conditions and over-all economy, tractors have opened new possibilities in logging.

The introduction of tractors has changed the methods of transporting logs in many parts of the world. They are used for performing so many different operations in the timber industry that a tractor may be classified as a most flexible and valuable equipment. Old methods of logging with animals have been replaced by tractors. Tractors have much greater speed and power than animals and are able to work on rough topography and steeper slopes and at the same time skid long and heavy timber. After skidding logs to the landing the tractor can load trucks. It can then complete the job by towing the loaded trucks up steep grades or over soft spots on the haul road.

To increase tractor capacity the tractor may be equipped with a winch or a bulldozer blade. Tractors equipped with double- or triple-drum winches are often used in high load logging.

According to their mode of locomotion tractors are of two different types: wheel tractors and crawler tractors. Wheel tractors are used in skidding such small material as pulpwood, poles, small logs.

For heavy logging, however, the crawler tractor is required. Crawler tractors are very flexible. This is very important for work on uneven surfaces. Obstacles, such as stumps and stones, may be readily overcome by crawler tractors. The useful life of crawler tractors on logging operations is from 8 to 10 years when they are in constant use. The depreciation and maintenance charges vary widely with the conditions and character of work.

Modern crawler-type tractors are widely used for skidding and hauling logs. Skidding in open forests may be done without any road preparation.

This type of tractors is often used with a trailer or semi-trailer and may be equipped with winches.

The average speed of crawler tractors when hauling logs is approximately 3-4 km per hour, while the speed without a load is 8-10 km per hour.

Text B

Finishing Wood Furniture

Each piece of solid wood furniture is an original, the result of nature's handiwork. Every item has its own grain pattern and color, according to the character of the wood. Light and dark areas blend during the finishing process to produce the uniquely attractive look of real wood furniture.

Most unfinished pieces need additional fine sanding before finishing to avoid surface fuzz or roughness that will show when the stain is applied.

Oak should be sanded to medium smoothness with medium-coarse sandpaper. Other woods should be sanded with medium sandpaper, generally no finer than 150-grit.

Stains contain coloured pigments that often settle to the bottom of the can and must be thoroughly mixed before application.

To apply stain, almost any type of rag (cotton works best) cut approximately 10 inches square can be used. Stain can be applied in any direction, usually cross-grain first.

Pine, aspen and some other woods stain more evenly if a sealer coat is applied before the stain.

Stain one surface at a time, and do the corners and uneven areas first. As you stain each area, wipe with the grain to remove excess stain, then move to another area. As you finish, go back over the entire piece with a clean rag to pick up all excess stain and wipe the surface dry.

Most clear top coats are designed to be wiped on. You can use a brush, but wiping helps prevent runs. Apply at least one coat of clear finish to all surfaces, both seen and unseen, to prevent cracking as the piece continues to dry out over the years.

Do one small area at a time, applying the top coat with the grain. In corners, you may need to pat the coating on or apply with a circular motion to get full coverage.

Allow coating to dry. The surface will feel gummy if not fully dry, and drying time will vary depending on weather conditions.

Sand the dried coating with very fine wet/dry sandpaper to remove any fuzz. Wipe sanded piece with a tack cloth or a rag dampened in mineral spirits to remove debris.

Text C

Sun-Driven Engine

It is common knowledge that certain metals and their alloys are attracted by a magnet. After heating, this property vanishes; it is restored after cooling down. A new magneto-heat engine works on this principle. This invention relates to devices which transform thermal power, for instance, the power of the sun rays, into a mechanical power of rotation.

We know solar power is inexhaustible and its use does not harm the environment. That's why such importance is attached to the devices which make it possible to apply the idea of direct use of solar power, transforming it into mechanical forms of power. The development of an engine directly driven by a heat source such as solar power, makes it possible to simplify and make power generation considerable cheaper, in comparison to the existing thermal engines we use today.

The rotor of the new engine is made of an alloy that loses its magnetic properties already at 100° C. If the motor is heated on one side, the cold side of the rotor will turn toward the magnet. Since heating continues, the rotor goes on rotating, too. Thus solar power can be used as a source of heat in this case. The magneto-heat engine can drive pumps in waterless districts, can also be used for watering greenery in cities and settlements.

By using thermomagnetic alloys it is possible to develop a lot of automatic devices, for example, solar clocks, thermometers, etc. Mention should be made that these devices can withstand extreme

temperatures. To organize the production of the necessary alloys is simple as there is no need for rare materials or complex industry.

Text D

Strategies for Sustainable Development

The availability, potential, and feasibility of primary renewable energy resources must be analyzed early in the planning process as part of a comprehensive energy plan. The plan must justify energy demand and supply and assess the actual costs and benefits to the local, regional, and global environments.

Responsible energy use is fundamental to sustainable development and a sustainable future. Energy management must balance justifiable energy demand with appropriate energy supply. The process couples energy awareness, energy conservation, and energy efficiency with the use of primary renewable energy resources.

Actions for sustainable development

With the ultimate goal of sustainability, the following actions summarize an approach to reduce energy consumption:

- identify the availability, potential, and feasibility of primary renewable energy sources such as solar, wind, biogas, and geothermal to satisfy the justifiable energy needs of the development;
- apply the best principles of siting and architectural design to reduce energy demands and to minimize the need for energy-consuming utilities (air-conditioning, water heaters, high-level artificial lighting);
- make energy production and use a visible component of the sustainable development. Broaden visitor experiences by awareness of energy use issues and the use of efficient appliances, conservation methods, and renewable energy sources. Install energy meters to monitor and illustrate energy consumption.

SUPPLEMENTARY TEXTS FOR TRANSLATION

Part A

FOREST ENGINEERING

Limbing and Bucking

Cutting the stem of the fallen tree into logs is called bucking. The first step in bucking is to cut the limbs from the bole. This is done by an axe or special mechanisms. Safety rules demand that the buckeer should stand on one side of the trunk and cut the limbs on the other.

Bucking is usually done by power saws used in felling. More bucking is done at the landings and in lower yards. Crooks, knots, pitch, worm holes and other defects are factors that influence the length of the logs to be cut. Defective logs are suitable for the manufacture of various

products. Generally speaking, the main purposes of bucking are: reduction of weight, elimination of defects, and adaptation to methods of transportation and manufacture.

Bucking calls for knowledge of specifications for different classes of logs. The higher grades are usually the long logs, 12 ft, and up. Careful selection of log lengths will avoid unnecessary crook. Defects can often be placed at the butt end of a log. Before bucking, all stems should be divided on the basis of products, for example, saw logs, veneer logs, pulpwood. Small trees can often be skidded full lengths to a landing where they can be bucked into suitable lengths cheaper than in the woods.

When the tree lies flat on the ground, bucking is a simple matter. When the bole is supported at the end, care must be exercised to avoid splitting slabs from the under side. This is accomplished by making a cut 2 or 3 inches deep on the under side of the bole. When the bole is sprung between trees or stumps the general practice is to make a deep cut on the concave face and then to saw the outer face. In small and medium sized timber it is generally the duty of the felling crew to cut the bole into logs as soon as the tree has been felled.

Partial Cutting

Partial cutting consists generally of the removal of some of the larger, mature, or overmature trees. There is an optimum size and age to which timber should be grown. Trees allowed to grow beyond optimum size decline in value. Under proper management, the optimum size is carefully determined and the oldest and the largest trees are cut. In selecting trees to be cut, consideration should always be given to the conditions of the bole, the health of the tree and its age.

Partial cutting is widely used in all parts of our country. After partial cutting the forest is left in a better condition for future growth. Partial cutting is especially adapted to rapid growing and uneven aged stands. The removal of the large-crowned and dominant trees that are mature or overmature stimulates the growth of the trees to increase in size and improve in quality for a later cut.

Young trees are often injured during partial cutting. Damage from felling can be reduced by refraining from dropping trees against trees that are left standing. Little damage may occur during limbing and bucking of felled trees. The amount of damage to the residual stand during skidding depends largely on the type of the equipment. Tractors and skidding devices necessary for moving big logs can cause a large amount of damage. The greatest destruction occurs when cable skidding is done with powerful stationary donkey engines. This type of

equipment can be used only where there are large volumes of big timber concentrated in relatively uniform stands.

Main tractor roads should be laid out before cutting. They should be as straight as possible and avoid clumps or young growth. Tractors should not be driven across from one road to another. Trees should not be felled parallel with the roads, because it necessitates turning the logs. Two logs should never be hooked together at the same cut and then pulled out sidewise.

Tree Measurement

In logging it is very important to determine when to cut, where to cut, how much and what kind of timber to remove.

The branch of industry which seeks to measure forests in terms of growth, volume and value is known as forest mensuration. It measures diameters, heights, circumferences, logs, piles, pulpwood. The tools of greatest use in measuring forests and their rough products are those by which diameters, circumferences, heights and irregularities of form and defects may be determined.

The desired lengths for logs are measured on the bole allowing from 2 to 3 in. for trimming in the mill after which the tree is bucked. If these pieces are 8 ft. long or over, and suitable for lumber, they are called logs, if under 8 ft., bolts. The length of felled trees is measured with a tape.

Measurement of volume. The tree units in which trees and logs are commonly measured are the board foot, the cube and the cord. The most common of these is the board foot. This unit represents a board 1 ft. wide, 1 in. thick and 1 ft. long.

A cube is a block of timber 12 in. long, 12 in. wide by 12 in. thick.

A cord represents a pile of wood 4 ft. high, 4 ft. wide and 8 ft. long (4 by 4 by 8 ft.)

Diameter at breast height. The diameter of standing trees is most commonly measured at breast height (d.b.h.) – 4 1/2 in. above the ground. It is the most important measurement of either felled or standing trees. Height above ground is nearly always measured from the average ground level. Several instruments are used for measuring the diameters of trees. Which is preferable depends on such circumstances as the position and condition of the part of the tree that is to be measured, the degree of accuracy required, and the portability of the instrument. In practical work tree calipers and tapes are widely used.

Measuring of scaling log. The logs may be scaled in the woods before being yarded to given centres of the railway or landing from which they can be loaded for transport. The scaler usually numbers each

log and stamps it with a marking hammer. Lengths of logs are checked frequently and this can often be done by the length of cars, trucks or decks.

Waste in Bucking

Waste usually occurs in the division of a bole having a crook or sweep. It is more serious in small than in large timber because the percentage of loss in slabbing at the mills is much greater. Logs which crook or sweep are more expensive to handle both in the forest and at the mill than straight logs of the same diameter and length because more time is required to skid, to load and to handle them in the mill. Another source of waste is the cutting of forked trees. The chief fault of the fellers in this regard is: felling the tree so that the lower fork is either imbedded in the ground or so placed that it is difficult to saw it properly.

Buckers frequently do not give as much attention to quality as they do to quantity. Where timber has large limbs the general practice is to leave the greater part of the tops in the woods because lumber of low grade only can be secured from them. This policy is costly because the value of the log is determined by its poorest sections.

A large loss usually occurs in cutting broken timber into logs by making the saw-cut too far below the break. Often it is possible to obtain added material from such timber by cutting the log so as to include a portion of a broken end. One of the most extensive wastes occurs in the tops when all material below the larger limbs has not been utilized. Sections of good timber from one to several feet in length are often left.

The bucker's main task is to make a thorough study of the timber and to buck it with the least degree of waste.

Skidding

Transportation in logging may be divided into two parts: skidding and hauling. Skidding is the movement of the tree lengths from the stump to landings. Landings are the locations to which logs are skidded preparatory to being loaded and transported. They are the places where logs are unloaded from one type of transport to another.

Within recent years the prevailing practice has been to skid tree-lengths to landings. Logs are usually skidded by tractors. Here they are loaded on railroad cars and transported. In the felling areas there may be one or more landings. It depends on the type and density of the timber and the topographical conditions. Skidding is done by various types of tractors and winches. In swampy regions on steep and rocky slopes cable-hauling systems are adapted.

The choice of the method of skidding is based on some factors: the size and weight of tree-length stems, distance, the season of the year, the character of the topography.

Hardwoods weigh approximately twice as much as softwoods, and require more power to skid. Skidding downhill requires less power than on the level topography; degree of slopes thus affects the output. In general, the shorter the skidding distance, the greater the number of trips and the output per day.

The season of the year influences the method of skidding. The skidding resistance of logs is different over snow, dry ground, wet ground, and over different soil types. There are many devices which help to skid logs and other products from the stump to the landings and to the point of transportation. Such devices are drays, sleds, pans and so on. They facilitate the skidding and protect logs from dirt and gravel. Sleds are used to elevate large heavy logs, thus decreasing the tractive resistance.

To prevent the butt end of a log from cutting into the ground, the front end of the log may be rested on a skidding pan. This is usually nothing more than a large piece of heavy-gauge metal sheet, turned up at the front end and towed behind the tractor. The logs are fastened by means of choker hooks.

Harvesting Methods

In logging operations the cut-to-length method is mainly applied, and its share is increasing worldwide. As to the technology itself, it is still in the phase of rather fast development, i.e., harvesting machinery itself and computerized bucking systems undergo intensive development. So, in some respect the method is in the stage of replacing the old method and in some respect in the mature stage when development still continues. On the other hand, the conventional tree-length method in a global view may be seen as being in the mature or even in the reduction phase. For instance, in Russia conventional central conversion plants are a very expensive alternative. Admittedly, new ways to apply the conventional technology may make it more profitable. Such a new way to apply the tree-length method and a central conversion plant is to practise tree-length logging (or logging of sawlog-parts of stems) in the near vicinity of a sawmill and cut-to-length logging where transport distances are longer. The automated conversion plant is used for very exact, customer-oriented bucking by for example tomography technology. This kind of bucking can supplement the supply of different log dimensions and qualities exactly according to the demand. Log inventories can be minimised. Utilisation of slash as fuel can be applied effectively. Another possible and

probable future is full-tree logging of small-size trees (cut into parts) in thinnings. Then, debranching and debarking may be done with separate machines or a debarking drum.

Both sawlogs and pulpwood may be graded more intensively. The grading of pulpwood into different kinds of grades for pulping and energy production may happen as bolts in the forest or in a mill. Another way would be to grade the wood after chipping or other kind of processing. Possible future development of new wood products may require new applications of logging methods.

Small Tree Harvesting with a Farm Tractor

Farm tractors are often used in forest operations, particularly in small scale forestry. Some possible advantages when compared to specialized forest machines include:

- increased flexibility (they can also be used for other types of work);
- lower capital investment.

This increased flexibility and relatively low capital input can reduce the need to maintain high productivity and annual utilization.

Time studies of farm-tractor-based single-grip harvesters have indicated a relatively good productivity in comparison with specialized single-grip harvesters. The forest cranes in those studies were attached to the rear of the tractors.

The ergonomics of farm-tractors with a rear-mounted forest crane, or with the crane on the trailer, are often not acceptable. Often the operator has to work in a twisted and exhausting position as the operator's seat is mostly not turnable. On machines where the seat can be turned backwards, the room for the feet, legs, and knees is usually too narrow.

Attaching the forest crane to the front could allow the owners of such tractors to use them in the forest for part of the year. Tractors that can then be used are, first of all, those with seats that cannot be turned and those with too little room for feet, legs, and knees when the seats are turned in backwards position.

Part B

WOODWORKING

Ash

Ash is composed of 40 to 70 species, with 21 in Central and North America and 50 species in Eurasia. All species look alike microscopically. The name *fraxinus* is the classical Latin name for ash.

Distribution. The north temperate regions of the globe.

The Tree. Ashes are trees or shrubs with large, opposite, pinnately compound leaves, which are shed in the fall. The compound leaves have 2 to 11 leaflets. The flowers can be bisexual or there can be distinct male and female flowers on separate trees. The flowers have no petals and the fruits are dry with a flattened wing

The Wood.

General: the sapwood of ash is light brown, while the heartwood is brown to grayish brown. White ash and Oregon ash have lighter heartwood than the other commercial species. The width of the sapwood is 3 to 6 inches. It is ring-porous, with the latewood being composed of parenchyma which surrounds and unites the latewood pores in tangential bands. It has no characteristic odour or taste.

Working Properties. Ash is straight grained, heavy, hard, strong, stiff and wears smooth with high shock resistance. It machines well and is better than average in nail and screw holding capacity. It glues moderately well. Black, Green, Pumpkin and Blue ashes have lower specific gravities and lower strength properties, but are still moderately strong, hard, and stiff compared to other native hardwoods. They also split easier, shrink more, are average in workability and perform less well in service.

Durability. Classed as slightly to non-resistant to heartwood decay.

Preservation. No information available at this time.

Uses. Handle stock, baseball bats, unupholstered furniture, flooring, millwork, hand tools, sporting goods, boxes and crates.

Toxicity. No information available at this time.

Maple

Maple contains about 120 species native to Asia, North America, Mexico and Guatemala, and the European/Mediterranean region, with the rest in Eurasia, Malaysia and northern Africa. The Maples can be separated into two groups based on the ray widths of their microscopic anatomy, the soft maple group and the hard maple group. Species within each group look alike microscopically.

Acer is the classical Latin name of maple.

Distribution. Throughout most of North America, with commercial species in the eastern United States and Canada and the western coast of the United States (bigleaf maple).

The Tree. Maples grow to heights of 120 ft (36 m), with a diameter of 3 ft (1 m). Forest grown trees may have a clear bole of 60 ft (18 m).

General Wood Characteristics. Maple lumber comes principally from the Middle Atlantic and Lake States, which together account for

about two-thirds of the production. The wood of sugar maple and black maple is known as hard maple; that of silver maple and red maple as soft maple. The sapwood of the maples is commonly white with a slight reddish-brown tinge; the heartwood is light reddish brown, but sometimes is considerably darker. The sapwood is from 3 to 5 inches (76 to 127 mm) thick.

Hard maple has a fine, uniform texture, turns well on a lathe, is resistant to abrasion and has no characteristic odor or taste. It is heavy, strong, stiff, hard, and resistant to shock, and it has large shrinkage. Sugar maple is generally straight grained.

The wood of soft maples resembles that of hard maples but is not as heavy, hard and strong, the better grade of soft maple has been substituted for hard maple in furniture. The sapwood in the soft maples is considerably wider than that in the hard maples and has a lighter heartwood color.

Maple lumber sometimes has olive or greenish black discolored areas known as mineral streak or mineral stain, which may be due to injury. Maple wood stains well and takes a high polish. It is intermediate in gluing and has low decay resistance.

Furniture Styles (part 1)

A complete review of furniture styles encompasses hundreds of years and a myriad of influences. Historical periods as well as the rule of kings and queens have defined the categorization of the various styles. Geographical differences, political matters, and religious issues have affected the way furniture was designed and produced. Ancient architecture stimulated many different interpretations. Function and practical uses were also considered. There is no question that the American influence on furniture making and design resulted from the melting pot of people from all parts of the world.

Contemporary furniture is characterized by simple and clean lines. This style is void of the heavy carvings and ornate features of other furniture styles. Many pieces will utilize geometric forms and futuristic appearances. Practical functions in the products take precedent over dramatic and lavish appearances. Contemporary designers may incorporate classic and traditional features in subtle and understated ways. The wood and fabric used in contemporary furniture is often light, exotic, and trendy. Colours will follow the path of “ready to wear” clothing and are subject to change as fashion changes.

Traditional furniture is characterized by distinct design features. Carvings, overlays, pilasters, columns, pediments, claw, ball, masks, and animal heads are often incorporated in this generalized category. The classic details of traditional furniture are reflections of the periods

and influences of years gone by. In the days before mass production, the ornate and elaborate features described above were made possible by the careful execution by the old world craftsmen. Modern day technology can duplicate many of these hand made and craftsmen inspired designs. The woods used in traditional furniture will usually include cherry, walnut, mahogany, and oak. Fabrics include damasks, brocades, tapestries, and prints.

Furniture Styles (part 2)

Country furniture is often called Early American or Colonial. It generally evolved from the more traditional furniture designs of the European continent but adapted to the more rustic and rugged life in the new America. The heavy carvings and ornate features of traditional furniture give way to simple turnings and more relaxed interpretation of the classic traditional designs. Practical function and form are accented by simple carving, turnings, and trim accents. Pine, maple, birch and other softer woods are used in the construction. Fabrics will use patterns of plaid, checks, and country scenes to add to the folksy nature of this category

Oriental furniture is a direct reflection of the orient and the culture of that region. The furniture will be practical and functional. As in contemporary, the lines and designs will be simplistic with distinct accents of the oriental culture. Long sweeping curves are often incorporated in the design. Painted finishes with stencilling and gilding are commonly incorporated. The hardware used for drawer pulls and hinges may reflect intricate details with an overall feeling of simplicity. Fabrics used will include cotton prints, satin like feel, and a variety of solid but vivid colours. Prints may include scenes of the countryside or of animals.

Casual furniture is a combination of contemporary and country styling with a real emphasis on the comfort and function of the item. Rustic may be used to describe this particular category. This furniture appears to be well built and ready to use. The focus is on comfort and functions with less emphasis on design or design elements. Materials used will be oak, pine, birch, and maple. Fabrics will use textures in solid colours with the emphasis on durability.

The Art of Wood Engravings (part 1)

The art of wood engraving was in its height in quality from the early 1800's until about the 1880's. During this time period, this method was the only way to illustrate a book or newspaper. Printing technology hadn't been developed to reproduce actual photographs on an inexpensive, mass produced basis. Most illustrations in books,

magazines, or newspapers during this time were the result of a wood engraving. The wood used to make an engraving had to be carefully selected. The best wood for this purpose came from a box tree. In addition to being limited to using box wood, the individual logs had to be carefully selected. As many are aware, a tree trunk has rings that correspond to the age of the tree. These rings may be unevenly spaced due to climate changes from season to season. To work best for engravings, it was important that these rings be as evenly spaced as possible.

A uniform colour of yellow from the outside rim to the interior was also critical. Uneven colouring meant unequal hardness or softness of the wood itself. This made it difficult, if not impossible, to make a uniformly engraved line.

There is another important factor in the use of box wood for engravings. Box trees only grow to a mature height of about 15 feet with the trunk reaching a maximum of 6 inches or so. The trunk, being the largest portion, was used for making engravings. The trunk was cut into individual blocks for carving. Even using trunk portion, one slice wasn't large enough to do an engraving larger than 5 inches square. To make a larger engraving, several pieces were banded together. This iron band was looped around the outside edge and tightened to hold them together. After the blocks were bound together the surface was sanded to make it smooth and uniform in height.

The Art of Wood Engravings (part 2)

Before drawing on the wood, it had to be coated with India ink. This was so that as the engraver made the grooves into the wood, the original yellowish colour showed where the thin slice of wood had been removed. This, of course, provided a means to see how the print would actually look when printed. At this stage the wood was ready to drawn upon.

After finishing the basic drawing, the artist would hand rub a special mixture into the wood. The purpose for this rubbing was that by doing so the pencil marks would shine in the light and become more visible. Also, the mixture helped to provide a shield which protected the wood from any perspiration on the engravers hands.

The last stage was to remove the iron hoop that held the blocks together. This was so that more than one engraver could work on the engraving at the same time. Some engravers specialized in people, some in water texture, others in sky, and so forth. At this point the wood was ready to begin engraving or carving upon.

As complicated as engravings were to make, there were only four basic types of engraving tools needed. The names of these tools were gravers, tint-tools, gouges, and flat chisels. Each came in various sizes.

The graver was used to make outlines or to separate figures from one another. They were used for all delicate carving except where a series of parallel lines were going to be used. Parallel lines were called “tints”.

Tint-tools were chiefly used to cut parallel lines which enabled the engraver to show a tint or shade of grey. The difference between the cut that a graver made and one that a tint-tool made was in the shape of the groove. A graver cut a V shaped line while the tint-tool carved a groove that was equal in width at the top and bottom. It was this difference that made the lines appear as shades of grey rather than a series of lines. The closer together the lines were, the darker the tint appeared.

A gouger was used to remove larger areas that the engraver wanted to be white (or unprinted). One example of this technique was an engraving that was not “framed” on the page – that is no border.

The last stage was to reunite the individual blocks of wood in the iron hoop and tighten. In many cases, the engravings were not signed since so many people worked on it.

Polyurethane: a Versatile Finish

There are several different finishes that go by the name urethane or polyurethane (the terms are interchangeable), and that alone creates a certain amount of confusion. They have different appearance and application characteristics, and each has its advantages and disadvantages. The one common thread among them is durability. They all contain some sort of polyurethane resin that gives these finishes their name and imparts improved heat, chemical and abrasion resistance.

Oil-based polyurethane

Woodworkers have been brushing oil-based polyurethane onto furniture for years and generally regard it as a big improvement over varnish. Like varnish, it is somewhat amber in colour, brushes on nicely and dries rather slowly. However, it is a bit grayer than pure varnish, and thick coatings get too cloudy or plastic-looking. What is certain is that polyurethane has ability to ward off water, chemicals and stains but adds better resistance to heat and scratches. It is appropriate for any wooden object.

Gel-based polyurethane

Polyurethane gel is too thick to brush on but is less messy and makes a very convenient wipe-on finish. The durability of any finish is, in part, affected by its thickness. Because we tend to wipe finishes

much thinner than we brush them, the wipe-on gels are less durable. So polyurethane gel is best used for low-wear projects, such as jewelry boxes, bookcases and even occasional tables.

Water-based polyurethane

Cloudy but clear. This water-based polyurethane has a skimmed-milk appearance in the can but retains the natural colour of the wood better than the other two types of polyurethane.

In many ways, water-based polyurethane has more in common with other water-based finishes than it does with other polyurethanes. Unlike the amber-colored oil-based versions, it is completely clear or very slightly bluish gray. Like all water-based finishes, it dries very fast, smells very little and is nonflammable. It is tough enough for most high-wear applications, including household furniture and even kitchen cabinets.

Part C

MACHINES AND MECHANISMS FOR FORESTRY COMPLEX

Main Component Parts of Tractor and Automobile (part 1)

Both the tractor and the automobile are complex self-propelled machines consisting of separate interacting mechanisms and units that can be combined into certain groups. Irrespective of particular design features, all tractors consist of engine, drive line, running gear, steering mechanism, working attachments, and auxiliary equipment.

The engine converts thermal energy into mechanical energy.

The drive line comprises a set of mechanisms which transmit the torque developed by the engine to the driving wheels or tracks and change the driving torque both in magnitude and direction. The drive line includes the clutch, flexible coupling, transmission (gearbox) and rear axle.

The clutch serves to disconnect the engine shaft from the transmission for a short period of time while the driver is shifting gears and also to connect smoothly the flow of power from the engine to the driving wheels or tracks when starting the tractor from rest.

The flexible coupling incorporates elastic elements allowing to connect the clutch shaft and the transmission drive shaft with a slight misalignment.

The transmission makes it possible to change the driving torque and the running speed of the tractor by engaging different parts of gears. With the direction of rotation of the engine shaft remaining the same, the transmission enables the tractors to be put in reverse.

The rear-axle mechanisms increase the driving torque and transmit it to the driving wheels or tracks at right angles to the drive shaft. In most tractors, the rear axle also comprises brakes.

Main Component Parts of Tractor and Automobile (part 2)

In the wheeled tractor, as distinct from its crawler counterpart, the drive line includes the differential which enables the driving wheels to revolve with different speeds when making turns or running over a ragged terrain, at which time the left- and right-hand wheels must travel different distances during one and the same time.

The running gear is needed for the tractor to move. The rotation of the driving wheels (or the movement of the tracks) in contact with the ground is converted into the translatory motion of the tractor.

The steering mechanism serves to change the direction of movement of the tractor by turning its front wheels (in wheeled tractors) or by varying the speed of one of the tracks (in crawler tractors).

The working attachments of the tractor are used to utilize the useful power of the tractor engine for various farm tasks. They include the power takeoff shaft, drawbar (hitch device), implement-attaching (mounting) system, and belt pulley.

The tractor auxiliaries include the driver's cab with a spring-mounted seat and heating and ventilation equipment, hood, lighting equipment, tell tales (indicators), horns, etc.

The arrangement and purpose of the main component parts of the automobile are in principle the same as those of the wheeled tractor. In the automobile, the drive line, running gear, steering mechanism, and braking system are referred to collectively as the chassis. The steering mechanism serves to change the direction of travel and the braking system, to slow down the running speed of the automobile or to stop it.

The auxiliaries of the automobile include a winch, cab heating and ventilation equipment, hitch bar, etc.

Storage Battery (part 1)

The storage battery, or simply battery, serves to supply power to the using equipment of tractors and automobiles when the engine is stopped or is running at a slow speed. It consists of a number of identical cells containing individual battery elements that are connected in series.

The battery is an electrochemical device that converts electrical energy to chemical energy (during charging) and then converts chemical energy back to electrical energy (during discharging). The tractors and automobiles use lead-acid storage batteries.

In its simplest form, a lead-acid battery comprises two lead plates placed in a plastic container filled with electrolyte (a solution of sulfuric acid and distilled water). The plate surfaces immersed in the electrolyte become coated with a thin layer of lead sulfate.

To make the battery operative, it must be charged, i.e., an electric current must be passed through it. When a d.c. current, supplied by an external power source, flows through the battery, a chemical action takes place inside it, as a result of which lead sulphate on the plate connected to the positive terminal of the power source gradually changes to lead peroxide, while lead sulphate on the plate connected to the negative terminal of the power source changes to sponge lead as gradually, sulfuric acid leaving the plates and returning to the electrolyte, thus increasing its density. Now, if a light bulb is connected to the plates, it will come on. Consequently, chemical energy that has been stored in the battery during charging converts to electrical energy during discharging.

Storage Battery (part 2)

A battery consists of case partitioned into cells. Each cell contains one battery element. The battery case is made from an acid-resistant plastic compound or hard rubber. On the bottom of the cells, there are ribs that serve to support the battery plates and form sediment chambers which allow the active material that wears off during charging and discharging to settle without interfering with the plates. Such interference would cause a short circuit. Each battery element comprises positive plates and negative plates assembled into two separate groups, the plates in each group being welded to a plate strap. The plates are made from a lead-antimony alloy in the form of a grid into which an active material – a lead oxide paste – is pressed. The positive plates are placed between the negative ones, and therefore the negative plate group has one more plate to cover the positive plate. This improves the chemical action during charging and discharging. Each plate is separated from its neighbouring plates by means of porous separators. The separators may be fabricated from specially treated wood, microporous plastic, or fiber-glass mat. They prevent contact between the plates, provide space for the electrolyte to contact the plates, and allow for free passage for the escaping gas. Each cell is covered by individual cover which is provided by filler plug. The plug serves two purposes. It can be removed so that the condition of the electrolyte can be checked and water added when necessary. It also has a hole through which the gas, formed during charging, can escape. The plate strap terminals are brought through the cell covers, so that connectors can be welded to them when the cells are joined together. In

the assembled battery, the edges of the cell covers are sealed with a special acid-resistant mastic.

The quantity of electricity that a fully charged battery can deliver while being discharged at a constant rate (current) until its terminal voltage falls to a definite value is called the capacity of the battery. It is measured in ampere-hours (A h). The ampere-hour capacity of a battery depends on the number and size of the plates; it is roughly proportional to the plate area.

General Design of Tractors (part 1)

The tractor is a wheeled or tracked self-propelled vehicle used as a power means for moving agricultural, road-building, and other machines equipped with special tools, and also for towing trailers. The tractor engine can be used as a prime mover for active (moving) tools or stationary farm machinery through the intermediary of the power takeoff (PTO) shaft or belt pulley.

The uses of the tractor in agriculture are many, and so different types of tractors are needed to do different types of farm work.

Farm tractors are classified as follows.

As to purpose, modern farm tractors are classed in three groups: general-purpose (land utility) tractors, universal-row-crop (row-crop utility), and special purpose tractors.

Land utility tractors are used for major farm operations common to the cultivation of most crops, such as tillage, disking, general cultivations, harrowing, sowing, and harvesting. The tractors are characterized by a low ground clearance, increased engine power, and good traction, thanks to their wide tires or tracks enabling them to develop a high pull.

Universal-row-crop tractors are intended for row-crop work, as well as for many other field tasks. For this purpose, some row-crop utility tractors are provided with replaceable driving wheels of different tread widths – wide for general farm work and narrow for row-crop work. In order not to damage plants, the tractors have a high ground clearance and a wide wheel track can be adjusted to suit the particular inter-row distance.

General Design of Tractors (part 2)

Special-purpose tractors are modifications of standard land or row-crop utility tractor models and are used for definite jobs (e.g., in vineyards, cotton fields) or for various jobs under certain conditions (e.g., on marshy soils, hillsides). Thus, special tractors used to mechanize the cultivation of cotton have a single front (steerable) wheel, swamp tractors are equipped with wide tracks enabling them to

operate on marshy soils and hillside tractors are designed to work on hillsides sloping at up to 16°.

As to the design of the running gear, tractors are divided into crawler (track-laying) and wheeled types.

Crawler tractors are distinguished by a large ground contact area and therefore have a good track adhesion; they crush and compact the soil insignificantly. Such tractors show a high cross-country power and are capable of developing a high pull.

Wheeled tractors are more versatile and can be used for both field and transport work, but their traction is lower than that of crawler tractors.

As to the type of undercarriage, tractors may be framed, semi-framed or frameless. The body of framed tractors is essentially a riveted or welded frame, that of semi-framed tractors is made up of two short longitudinal beams (side members) bolted or welded to the rear axle housing, while in frameless tractors, the body is formed by bolting together the casings of individual tractor mechanisms.

As to the normal drawbar (DB) pull, tractors are divided into several classes differing in design.

Shaper

The shaper is employed to do planing operations on small to medium sizes of workpieces. The size of the machine is described by stating the maximum stroke of its ram; thus, a 20 in. shaper will machine work up to 20 in. in length. Shapers are seldom employed to machine work more than 2 feet square, and a shaper with a 3-foot stroke is the largest size built.

The main casting of a shaper is a hollow, boxlike column that rises from a base which rests on the floor. The column houses a part of the machine's driving mechanism. The front of the column is machined to provide vertical bearing surfaces on which a crossrail is mounted. The crossrail, and the parts it supports, may be raised and lowered on the face of the column with an elevating screw to accommodate workpieces of different heights which are set up on the machine. A cross-feed screw in the crossrail is used to feed the saddle and table.

A saddle that is mounted on the crossrail may be moved horizontally by hand or power with the cross-feed screw to adjust jobs into working position or to feed them during cutting operations. A table for supporting workpieces and work-holding devices is fastened to the front of the saddle.

The top of the shaper is planed to form ways that support and guide a ram which moves forward and backward along a horizontal both in a cutting and return stroke cycle. Mounted on a circular seat at

the front end of the ram is the toolhead. A tool slide is held on the circular seat of the ram.

A clapper box and clapper block are mounted on the tool slide. A tool post that holds the single-point cutting tool is mounted in the clapper box. The cutting tool acts during the forward stroke of the ram and is idle during the return stroke. In crank type shapers the tool carrier or ram is caused to move by a crank arm connected to the driving gear or bull wheel by means of a crank pin.

Part D

ENERGY-EFFECTIVE TECHNOLOGIES AND ENERGY MANAGEMENT

In Search of New Energy Sources

Today mankind sharply needs in replacement of existing energy technologies with ecologically clean guaranteeing preservation of biosphere ones. It especially concerns energy based on combustion of natural coal stores, oil, gas and uranium. The levels of received energy remain insignificant and the problem of energy supply does not find the solving. The delivery of energy to the consumers also remains expensive.

The world has not found yet ecologically clean energy and methods of its receiving safe for biosphere, despite of hugest expenses in this direction. The limitation of energy resources set a task of search essentially new methods of receiving energy.

When analysing the most widespread methods of receiving energy being used now it is possible to see certain regularity. The substance is a final product of all circuit energy transformations in modern methods of receiving energy. And this final substance becomes, as a rule, more dangerous to biosphere than initial energy carrier. It concerns energy based on combustion of natural fuel both atomic power and nuclear fusion. The task is to find completely new methods of receiving energy free from the traditional scheme: “substance in the beginning – substance in the end”.

Only such methods in which at a final stage of energy transformations a substance dangerous to biosphere will not appear or substance absolutely will be absent as such can become alternative to existing methods of receiving energy. It seemed despite of the paradoxical formulation, the solving a problem exists and this solving gives physical vacuum. Therefore, now directions of searches of new methods of receiving energy have moved on area of physical vacuum and their intensity roughly rise last years.

Completely real is the creation of essentially new generators which capable of using environment energy and transforming it into the convenient form of energy. And there are serious experimental proofs to it.

How Do Fossil Fuels and Biomass Pollute?

You have probably heard of something called “global warning” before. Perhaps you are also familiar with the term “greenhouse effect”. Because those two terms are so important in understanding the pollution problem associated with burning biomass and fossil fuels, we should touch upon their definitions now.

Scientists believe that global warming is caused by the “greenhouse effect”. The greenhouse effect describes the accumulation of carbon dioxide in our earth’s atmosphere. A layer of gas forms that traps heat inside the atmosphere, thereby acting as the glass ceiling of a greenhouse. Because heat is trapped by the carbon dioxide, it is believed that the earth is slowly warming. Before humans were around on the earth, there was a relatively even recycling of carbon dioxide and oxygen. Plants require carbon dioxide to live, and they emit oxygen in return. Animals, on the other hand, need oxygen, but exhale carbon dioxide. But as humans began to burn fossil fuels to create energy (especially beginning just before the 20th century during the “Industrial Revolution”), more and more carbon dioxide was emitted into the air until the balance was slowly destroyed.

All fossil fuels and biomasses consist of carbon and hydrogen atoms. When these fuels are burned, or “combusted”, carbon atoms unite with oxygen in the air to form carbon dioxide:

Carbon dioxide is not the only by-product of direct combustion of fuel. Small “particulates” that can become imbedded in the human respiratory system are also emitted. Particulates can cause coughing and damage to the lungs. Further, they can lead to cancer and lung disease.

Carbon monoxide is produced when less oxygen is available in the immediate area. Carbon monoxide is more directly harmful to humans because it is odourless, colourless, and reduces the body’s ability to transport oxygen. This leads to fatigue, nausea, and headaches (flu-like symptoms).

Tidal Power

The tide moves a huge amount of water twice each day, and harnessing it could provide a great deal of energy – around 20% of Britain’s needs.

Although the energy supply is reliable and plentiful, converting it into useful electrical power is not easy.

Only around 20 sites in the world have been identified as possible tidal power stations.

A huge dam (called a “barrage”) is built across a river estuary. When the tide goes in and out, the water flows through tunnels in the dam.

The ebb and flow of the tides can be used to turn a turbine, or it can be used to push air through a pipe, which then turns a turbine. Large lock gates, like the ones used on canals, allow ships to pass.

The largest tidal power station in the world (and the only one in Europe) is in the Rance estuary in northern France. It was built in 1966.

A major drawback of tidal power stations is that they can only generate when the tide is flowing in or out – in other words, only for 10 hours each day. However, tides are totally predictable, so we can plan to have other power stations generating at those times when the tidal station is out of action.

There may be a number of benefits, including protecting a large stretch of coastline against damage from high storm tides, and providing a ready-made road bridge. However, the drastic changes to the currents in the estuary could have huge effects on the ecosystem.

Advantages:

1. Once you've built the dam, tidal power is free.
2. It produces no greenhouse gases or other waste.
3. It needs no fuel.
4. It produces electricity reliably.
5. Not expensive to maintain.
6. Tides are totally predictable.

Disadvantages:

1. Very expensive to build.
2. Affects a very wide area - the environment is changed for many miles upstream and downstream.
3. Many birds rely on the tide uncovering the mud flats so that they can feed.
4. Only provides power for around 10 hours each day, when the tide is actually moving in or out.
5. There are very few suitable sites for tidal power stations.

Tidal energy is renewable. The tides will continue to ebb and flow, and the energy is there for the taking.

Petroleum

Petroleum, or “crude oil”, is a liquid fuel that is present in various locations throughout the world. It has many uses, from the generation of electricity to the manufacture of medicines, plastics, and other commercial items.

Much like coal, petroleum is formed from the remains of biodegraded organic material. When animals that lived in the sea millions of years ago died underwater, their remains were gradually covered by layers of very fine dirt known as “silt” on the ocean floor. Then, as the years passed, pressure from the layers built up and compressed the organic material, forming the oil.

Petroleum has many different “viscosities”, or thicknesses. The viscosity depends on the amount of gases and solids that are present in the oil. Often, natural gas is dissolved in the liquid and can be extracted for other uses. Petroleum takes three main forms: paraffin, asphaltic, and mixed-base. Petroleum originates under the floor of a body of water.

Before the current uses of petroleum were discovered, its main applications were waterproofing and light emission. In the mid-1800s, it was found that a liquid fuel called “kerosene” could be isolated from crude oil. Kerosene was important because it was used a great deal for lighting purposes during the rest of the 19th century.

During the industrial revolution of the late 1890s, new energy sources were required to fuel the innovations constantly being discovered. Thus, people began to experiment with crude oil’s other properties. Distilled petroleum began to overtake coal as the primary heating fuel. Furthermore “gasoline”, a fuel that could be distilled from crude oil, took on central importance in industrialized societies because of the inventions of the automobile and the internal combustion engine.

Furthermore, the development of electricity around the turn of the century increased demand for fuels that could be burned to power generators, thus increasing demand for petroleum. Petroleum can also be directly combusted to heat houses and other buildings. Unfortunately, its combustion can contribute to pollution and the greenhouse effect.

Energy Conservation

At the beginning of the planning process, a determination must be made to avoid energy-intensive or unnecessary operations. Considerable energy can be conserved if access to, from, and within a development is planned around transportation systems, bicycle routes, and pedestrian walkways rather than perpetuating the use of personal automobiles.

Facility design can contribute to energy conservation in several ways. Through recycling existing facilities, building only the minimum to satisfy the functional requirements, and having facilities serve multiple functions, the embodied energy of new building materials and the energy of transporting and constructing them are minimized. In

addition, considerable electrical and thermal energy can be saved through facility design that incorporates day lighting and the other passive energy-conserving strategies.

In all cases, mechanical air-conditioning of facilities is energy-intensive, and in most cases, proper attention to the principles of site planning and building design can effectively eliminate its need. Breezes, the sound of birds or the surf, and the smell of flowers are fundamental to the perception of air. Wind chimes, used in traditional Japanese architecture, serve as a gentle reminder of a cool breeze. The sound of trickling water in a courtyard fountain can impart the perception of coolness. A ceiling fan spinning overhead can provide not only a sensory but also a psychological feeling of a cool breeze.

In visitor lodging, energy use can be minimized through “designed-in” restrictions or charges on consumption to visitors. Elimination of electrical outlets in individual lodging units would curtail the use of visitor appliances such as hair dryers and electric cooking utensils. Instead, electricity should be provided only at central locations such as bathhouses, and limited in individual units to fixed devices or appliances, such as lighting or a fan. Certain services such as laundry or showers or high wattage electrical outlets could be coin operated and timed because they are so energy intensive.

The Consumption of Energy

Most modern architecture, transportation, and food production was created upon, and is dependent on, the assumption that using fossil fuels for energy is economical and that their supply is inexhaustible. Few people are aware of the true costs associated with the overuse of fossil fuels. Mining that displaces habitats, forest cover, and farmland; oil spills that foul beaches, marine environments, and groundwater; and air pollution that reduces the chances for species survival are difficult to associate with flipping on a light switch, running an air-conditioner, or driving a car.

In reality, unchecked consumption of the finite fossil fuel reserves drives more and more exploration and extraction at a higher economic cost, and displaces more and more natural resources at a higher environmental cost. A compounding reality is that generating energy by burning coal, oil, and natural gas is a major source of atmospheric contamination responsible for global warming and climate change, acid rain, and smog. The resulting impact damages water bodies and groundwater, soils, crops, wildlife and wildlife habitat, building materials, and mankind’s personal health. The combined effect is the inability to sustain life. Thus, the true cost of using fossil fuels for

highly consumptive energy needs is not just the price humans pay, it is also the price the environment pays.

Renewable energy resources are sun, wind, and biogas conversion. Solar applications range from hotwater preheat to electric power production with photovoltaic cells. Wind-powered generators can provide electricity and pumping applications in some areas. The biogas conversion process reduces gas or electricity costs and eliminates the release of wastewater effluent into water resources. With known technologies the intelligent use of primary renewable energy resources can benefit any development.

IV. ГРАММАТИЧЕСКИЕ ОСНОВЫ ПЕРЕВОДА

1. Страдательный залог (The Passive Voice) и его перевод на русский язык

Страдательный залог имеет чрезвычайно широкое распространение в английском научно-техническом языке.

Страдательным залогом мы называем такую конструкцию предложения, при которой подлежащее не является действующим лицом (или предметом), а само подвергается действию со стороны дополнения (при этом дополнение может лишь подразумеваться, не будучи выражено в предложении):

Radium was discovered in 1898 (by the Curies).

Радий был открыт в 1898 г. (супругами Кюри).

Сказуемое в пассивной форме состоит из вспомогательного глагола *to be* в соответствующем времени и причастия прошедшего времени смыслового глагола.

am is + Participle II are	Present Indefinite Passive Voice	These tools are made of steel.
was were + Participle II	Past Indefinite Passive Voice	The equipment was tested yesterday.
shall be will be + Participle II	Future Indefinite Passive Voice	The work will be finished at 5.
am is + being Participle II are	Present Continuous Passive Voice	A new bridge is still being built.
was were + being Participle II	Past Continuous Passive Voice	When I entered the laboratory a new experiment was being carried out there.
have has + been Participle II	Present Perfect Passive Voice	The results of the project have been published lately.

had + been Participle II	Past Perfect Passive Voice	The experiment had been finished by 4 o'clock yesterday.
shall will + have been Participle II	Future Perfect Passive Voice	All exams will have been passed by the end of June.

Страдательный залог при переводе на русский язык может быть передан:

1) кратким страдательным причастием прошедшего времени с суффиксом *-н* или *-т* (с вспомогательным глаголом *быть* или без него), т. е. русским страдательным залогом:

The experiments *were made* last year.

Опыты (*были*) *проведены* в прошлом году.

2) возвратным глаголом на *-ся* в соответствующем времени, лице и числе:

Different problems of modern science *are often discussed* at the research conferences.

Различные проблемы современной науки часто *обсуждаются* на научно-исследовательских конференциях.

3) глаголом действительного залога в соответствующем времени, 3-м лице мн. числа, являющимся частью неопределенно-личного предложения:

The experiment *was conducted* in this laboratory.

Эксперимент *проводили* в этой лаборатории.

4) предложения с сочетаниями «модальный глагол + инфинитив страдательного залога» рекомендуется переводить со словами *можно, нужно, следует* и др.:

The problem *must be solved*.

Эту проблему *нужно решить*.

5) страдательный оборот с подлежащим *it* переводится неопределенно-личным предложением:

It was thought... – *Думали, полагали...*

It is known... – *Известно...*

6) в английском языке формой выражения лица или предмета, производящего действие, является косвенное дополнение с предлогом *by*. На русский язык такие дополнения могут быть переведены: а) существительным в творительном падеже при сохранении формы страдательного залога сказуемого, б) существительным в именительном падеже или местоимением; при этом английский страдательный залог передается действительным залогом:

The device *was designed* by our engineers.

а) Прибор *был сконструирован* нашими инженерами.

б) Наши инженеры *сконструировали* этот прибор.

7) предлог, стоящий после глагола в страдательном залоге и не относящийся к следующим за ним словам, при переводе на русский язык ставится перед тем словом, которое в английском предложении является подлежащим:

The results *can be relied upon*.

На эти результаты *можно положиться*.

The book *is* often *referred to*.

На эту книгу часто *ссылаются*.

2. Модальные глаголы (Modal Verbs) и их перевод на русский язык

В языке существует грамматическая категория модальности, передающая отношение говорящего (или пишущего) к предмету своего высказывания. Рассмотрим глагольные способы выражения модальных оттенков долженствования и возможности, наиболее часто встречающиеся в английских научно-технических текстах.

а) Долженствование:

must

Must в сочетании с инфинитивом смыслового глагола (который теряет здесь показатель инфинитива – частицу *to*) выражает необходимость или неизбежность совершения действия в силу определенных обстоятельств, а также служит для выражения совета или приказа. Переводится на русский язык с помощью *должен*, или безличными оборотами *нужно*, *надо*, *необходимо*:

Force *must* be applied to produce motion.

Чтобы вызвать движение, *необходимо* приложить силу.

to have (to)

Глагол *to have* в сочетании с инфинитивом смыслового глагола выражает необходимость совершения действия в силу определенных обстоятельств и близок по значению к глаголу *must*, заменителем которого он часто выступает, и переводится *надо*, *нужно*, *приходится*:

Our scientists *had to* solve many complicated practical problems in the construction of the first atomic power plant.

Нашим ученым *пришлось* разрешить много сложных практических задач при строительстве первой атомной электростанции.

to be (to)

Глагол *to be* в сочетании с инфинитивом смыслового глагола выражает необходимость, вытекающую из договоренности или намеченного плана, и переводится *должен*:

The new line of the Metro **is to** be commissioned next spring.

Новая линия метро **должна** вступить в строй следующей весной.

should

Глагол *should* в сочетании с инфинитивом смыслового глагола (без частицы *to*) употребляется со всеми лицами и выражает необходимость, обусловленную моральным долгом или советом, и переводится *должен, следует, следовало бы*:

You **should** lower the voltage in the circuit.

Вам **следовало бы** уменьшить напряжение в цепи.

ought to

Глагол *ought* с последующим инфинитивом смыслового глагола выражает необходимость, обусловленную моральным долгом или советом и аналогичен глаголу *should*, но употребляется значительно реже и переводится *должен, следует, следовало бы*.

He **ought to** know the properties of the material.

Ему **следовало бы** знать свойства этого материала.

б) Возможность:

can

Глагол *can* в сочетании с инфинитивом смыслового глагола (без частицы *to*) выражает физическую возможность, способность или умение совершить действие и переводится *мочь, уметь*:

Man **can** subdue atomic energy

Человек **может** подчинить себе атомную энергию.

I **can** handle the rheostat.

Я **умею** обращаться с реостатом.

Сочетание глагола *can* с инфинитивом в пассивной форме обычно переводится безличным или неопределенно-личным оборотом:

Electric energy generated at the power station **can be transmitted** over long distances.

Электроэнергию, вырабатываемую на электростанциях, **можно передавать** на большие расстояния.

Заменителем глагола *can* является оборот *to be able (to)*:

Any moving object **is able to** do work.

Любой движущийся предмет **может** произвести работу.

may

Глагол *may* в сочетании с инфинитивом смыслового глагола (без частицы *to*) выражает разрешение, позволение, возможность или предположение и переводится *могу, можно, разрешено, может быть, возможно*:

You **may** touch the wire, as the circuit is open.

Вы **можете** дотронуться до провода, т. к. цепь разомкнута.

One kilogramme of uranium *may* produce 20 million kilowatt-hours of electricity.

Один килограмм урана *может* дать 20 миллионов киловатт-часов электроэнергии.

He *may* finish his work today.

Он, *может быть (возможно)*, окончит работу сегодня.

3. Инфинитив (The Infinitive), его функции и способы перевода на русский язык

Инфинитив является неличной формой глагола, формальным признаком которой является частица *to*, но во многих случаях инфинитив употребляется без частицы *to*. Инфинитив только называет действие, но не указывает ни лица, ни числа.

В английском языке имеются следующие формы инфинитива:

	Active	Passive
Indefinite	<i>to write</i>	<i>to be written</i>
Continuous	<i>to be writing</i>	-
Perfect	<i>to have written</i>	<i>to have been written</i>
Perfect Continuous	<i>to have been writing</i>	-

Перевод инфинитива зависит от его функции в предложении:

1) подлежащее:

To transmit the image by radio has become a practical possibility not so long ago.

Перевод инфинитива-подлежащего производится с помощью русского инфинитива или существительного:

Передавать изображение по радио стало практически возможным сравнительно недавно.

Передача изображения по радио стала практически возможной сравнительно недавно.

2) часть составного именного сказуемого:

The objective of our work is *to find* the best solution of the problem.

Перевод осуществляется с помощью инфинитива:

Цель нашей работы состоит в том, чтобы *найти* наилучшее решение проблемы.

3) часть составного глагольного сказуемого:

С модальными глаголами (после которых частица *to* опускается):

All the progressive peoples must *fight* for peace.

Все прогрессивные народы должны *бороться* за мир.

С некоторыми глаголами, которые без инфинитива не выражают законченной мысли, например: *to want* хотеть, *to like*

любить, нравиться, *to intend* намереваться, *to hope* надеяться, *to promise* обещать, *to begin* начинать и др.:

We hoped ***to obtain*** good results.

Мы надеялись ***получить*** хорошие результаты.

Во всех этих случаях перевод осуществляется также с помощью русского инфинитива.

4) дополнение:

Инфинитив выступает в функции прямого дополнения лишь в тех случаях, когда он выражает действие, совершаемое не подлежащим, а косвенным дополнением и переводится русским инфинитивом:

He asked us ***to return***.

Он попросил нас ***вернуться***.

5) определение:

Инфинитив – определение (определятельный оборот) всегда следует за определяемым словом. Перевод может быть сделан четырьмя способами:

а) инфинитивом:

Automation is one of the ways ***to increase*** productivity

Автоматизация – один из способов ***повысить*** производительность.

б) причастным оборотом:

The wire ***to connect*** the terminals is 10 meters long.

Провод, ***соединяющий*** зажимы, имеет 10 метров длины.

в) существительным (часто с предлогом):

A thermometer is an instrument ***to show*** the temperature.

Термометр – это прибор ***для показания*** температуры.

г) придаточным предложением:

Voltage, resistance, and capacity are the three important properties ***to influence*** the flow of current in a circuit.

Напряжение, сопротивление и емкость – три важные свойства, ***которые оказывают влияние*** на движение тока в цепи.

Часто инфинитив-определение заменяет собой придаточное определятельное предложение, действие которого относится к будущему времени с оттенком долженствования. Он переводится придаточным определятельным предложением с модальным оттенком:

The question ***to be discussed*** (which is to be discussed) is of great importance.

Вопрос, ***который должен быть обсужден***, имеет большое значение.

Инфинитив нередко употребляется со словами *the first, the last*. В этих случаях он обычно переводится глаголом в личной форме:

К. Tsiolkovsky was ***the first to prophesy*** the wonderful prospects of jet propulsion.

К. Циолковский ***первым предсказал*** замечательное будущее реактивного движения.

б) обстоятельство цели и следствия:

Обстоятельство цели (иногда в сочетании с союзом *in order to*) переводится русским инфинитивом с союзом (*для того*), *чтобы*:

These systems are used ***to generate, transmit and distribute*** electric power.

Эти системы используются ***для того, чтобы производить, передавать и распределять*** электроэнергию.

Перевод может быть сделан и с помощью существительного с предлогом:

Эти системы используются ***для производства, передачи и распределения*** электроэнергии.

4. Оборот Complex Object, его употребление и перевод на русский язык

Инфинитив в сложном дополнении стоит после существительного в общем падеже или местоимения в объектном падеже, являющихся вместе с инфинитивом сложным дополнением к предшествующему глаголу. При этом инфинитив оказывается вторым членом сложного дополнения, а стоящее перед ним существительное (или местоимение) – первым.

Глаголы, после которых может употребляться сложное дополнение, выражают:

1) желание, ненависть, любовь: *to want, to wish, would like, to like, to desire, to hate, to love* и др.

I want ***you to check*** the results of the experiment.

Я хочу, ***чтобы вы проверили*** результаты эксперимента.

2) предположение, суждение, мнение: *to suppose, to consider, to think, to expect, to know, to find, to believe* и др.

He expects ***the students to have completed*** the work.

Он полагает, ***что студенты завершили*** работу.

3) приказ, просьбу: *to ask, to order, to command, to permit, to request* и др.

They asked for ***the letter to be sent off*** at once.

Он попросил, ***чтобы письмо отправили*** сразу.

4) восприятие органами чувств: *to see, to hear, to feel, to watch, to notice, to observe* и др. После глаголов этой группы инфинитив употребляется без частицы *to*.

Nobody noticed ***her leave*** the room.

Никто не заметил, ***как она покинула*** комнату.

Оборот *Complex Object* переводится придаточным дополнительным предложением с союзами *что, чтобы, как*. При этом союз ставится сразу после глагола, вводящего данный оборот. Инфинитив переводится глаголом в личной форме в функции сказуемого дополнительного придаточного предложения, а стоящее перед ним существительное (или местоимение в объектном падеже) – существительным (или местоимением в объектном падеже) в именительном падеже и становится подлежащим.

I know ***your colleagues (them) to work hard***.

Я знаю, ***что ваши товарищи (они) много работают***.

We think ***the talks to have come to an end***.

Мы полагаем, ***что переговоры завершились***.

5. Оборот *Complex Subject*, его употребление и перевод на русский язык

Инфинитив в обороте *Complex Subject* является вторым членом составного глагольного сказуемого и стоит после личной формы глагола – первого члена сказуемого.

Complex Subject употребляется:

1) при сказуемом в страдательном залоге, выраженном глаголами, которые обозначают умственную деятельность, приказ, просьбу или чувственное восприятие: *to think, to consider, to believe, to know, to expect, to say, to report, to ask, to order, to permit, to make, to see, to hear, to feel, to observe* и др.

The delegation is reported ***to arrive*** in two days.

Сообщают, ***что делегация прибудет*** через два дня.

They were heard ***to be discussing*** this problem.

Слышали, ***как они обсуждали*** эту проблему.

2) при сказуемом, выраженном глаголами *to seem, to appear, to happen, to prove, to turn out* и др.

I seem to be waiting in vain.

Кажется, ***я жду*** напрасно.

3) при составном именном сказуемом, выраженном *to be likely, to be unlikely, to be certain, to be sure*.

They are likely ***to leave*** for Moscow next week.

Вероятно, ***они поедут*** в Москву на следующей неделе.

Возможны два способа перевода оборота *Complex Subject*:

1) первый член сказуемого (глагол в личной форме) ставится перед подлежащим и переводится глаголом в неопределенно-личной форме. Оставшаяся часть предложения передается дополнительным придаточным предложением с союзом *что* (реже *чтобы*). Подлежащим придаточного предложения становится при переводе английское подлежащее, а инфинитив – его сказуемым.

2) порядок слов английского предложения сохраняется. Инфинитив переводится сказуемым, а глагол в личной форме передается вводным предложением с союзом *как*, вводным словом или оборотом:

This student is known to work hard.

1-й способ: Известно, ***что этот студент много работает.***

2-й способ: ***Этот студент,*** как известно, ***много работает.***

Если первый член сказуемого выражен одним из глаголов в действительном залоге (*seem, appear, prove* и др.) или сочетанием слов типа *be likely* и др., то союзы *что* (1-й способ перевода) и *как* (2-й способ перевода) опускаются:

He seems to know this rule well.

По-видимому, ***он*** хорошо ***знает*** это правило.

Он, по-видимому, хорошо ***знает*** это правило.

They are likely to come here.

Вероятно, они ***придут*** сюда.

Они, вероятно, ***придут*** сюда.

Они могут ***прийти*** сюда.

6. Причастие (The Participle) и его перевод на русский язык

Причастие является неличной формой глагола, т.е. такой формой, в которой не выражается ни категории лица, ни категории числа. Поэтому причастие самостоятельно не может выполнять функция сказуемого. Причастие имеет признаки как прилагательного, так и глагола.

В английском языке существуют два типа причастия:

1. причастие настоящего времени (*Present Participle* или *Participle I*) с окончанием *-ing*: ***reading***.

2. причастие прошедшего времени (*Past Participle* или *Participle II*) с окончанием *-ed* (***played***) для правильных глаголов, неправильные глаголы имеют разные формы.

	Active	Passive
Participle I	<i>taking</i>	<i>being taken</i>
Participle II	-	<i>taken</i>
Perfect Participle	<i>having taken</i>	<i>having been taken</i>

Перевод причастия зависит от его функции в предложении:

Present Participle Active

1) составная часть сказуемого, выраженного формой *Continuous* (в сочетании с глаголом *to be*) переводится личной формой глагола:

The liquid is ***boiling***.

Жидкость ***кипит***.

2) определение (ставится перед существительным или после него) переводится причастием:

All ***moving*** parts of machines wear.

Все ***движущиеся*** детали машины изнашиваются.

The atom contains a number of electrons ***revolving*** around the nucleus.

Атом содержит некоторое количество электронов, ***вращающихся*** вокруг ядра.

Перевод может быть сделан также развернутым придаточным предложением:

Атом содержит некоторое количество электронов, ***которые вращаются*** вокруг ядра.

3) обстоятельственный причастный оборот времени, причины или образа действия:

а) обстоятельство времени. Такие обороты соответствуют придаточным предложениям времени; иногда они начинаются союзами *while* или *when*, которые на русский язык не переводятся:

(While) making one of his experiments, he was seriously injured as a result of the explosion.

Эти обороты можно переводить тремя способами:

1) деепричастным оборотом:

Проводя один из своих опытов, он серьезно пострадал в результате взрыва.

2) существительным с предлогом:

При проведении одного из своих опытов он серьезно пострадал в результате взрыва.

3) развернутым придаточным предложением:

Когда он проводил один из своих опытов, он серьезно пострадал в результате взрыва.

б) обстоятельство причины. Эти обороты соответствуют придаточному предложению причины; они не имеют перед собой союза:

Knowing harmful effects of gamma rays, we took special precautions.

Перевод может осуществляться двумя способами:

1) деепричастным оборотом:

Зная вредное воздействие гамма-лучей, мы приняли особые меры предосторожности.

2) развернутым придаточным предложением:

Так как мы знали вредное воздействие гамма-лучей, мы приняли особые меры предосторожности.

в) обстоятельство образа действия переводится деепричастным оборотом:

We communicated with the Arctic expedition **using** short radio-waves.

Мы поддерживали связь с арктической экспедицией, **применяя** короткие радио-волны.

Perfect Participle Active and Passive

Обстоятельственные причастные обороты времени и причины могут переводиться деепричастием совершенного вида или придаточным предложением:

Having successfully **solved** the problem of splitting the atomic nucleus, the scientists could work out the methods of utilizing atomic energy.

Успешно **решив** задачу расщепления атомного ядра, ученые смогли разработать способы использования атомной энергии.

или

После того, как ученые успешно **решили** задачу расщепления атомного ядра, они смогли разработать способы использования атомной энергии.

7. Независимый причастный оборот (The Absolute Participial Construction), его употребление и перевод

В независимом причастном обороте перед причастием стоит существительное в общем падеже или местоимение в именительном падеже. Это существительное или местоимение является субъектом действия, выраженного причастием, и не совпадает с субъектом действия, выраженного личной формой глагола (т. е. не совпадает с подлежащим). Независимый причастный оборот переводится обстоятельственным придаточным предложением с союзами *так как, после того как, когда, если* и др. или самостоятельным предложением с союзами *а, и, причем*. Союз ставится перед существительным (местоимением), предшествующим причастию. Причастие переводится личной формой глагола в функции сказуемого, а стоящее перед ним существительное (местоимение) – подлежащим:

My colleague being away, I had to take the decision myself.

Так как мой коллега отсутствовал, мне пришлось самому принять решение.

Weather permitting, we shall go to the country.

Если погода позволит, мы поедем за город.

There being many people in the conference hall, we could not enter it.

Так как в зале было много народу, мы не могли войти.

8. Герундий (The Gerund), его признаки и перевод на русский язык

Герундий – особая грамматическая категория, отсутствующая в русском языке. Это неличная форма глагола, которая образуется путем прибавления окончания *-ing* к инфинитиву. Герундий имеет черты и глагола, и существительного. По форме герундий совпадает с причастием I.

Формы герундия:

	Indefinite	Perfect
Active	<i>reading</i>	<i>having read</i>
Passive	<i>being read</i>	<i>having been read</i>

Герундий может выполнять в предложении следующие функции: подлежащего, прямого дополнения, предложного дополнения, части сказуемого, определения (всегда в сочетании с предлогом; обычно с предлогом *of*), обстоятельства времени, цели, причины, образа действия и др. (всегда в сочетании с предлогом).

Вследствие того, что в русском языке нет формы, соответствующей герундию, его перевод осуществляется различными способами, а именно:

1) существительным:

Transformers are used for *changing* d.c. into a.c.

Трансформаторы применяются для *преобразования* постоянного тока в переменный.

2) инфинитивом:

Their aim was *collecting* all the necessary data.

Их цель заключалась в том, чтобы *собрать* все необходимые данные.

The fly-wheel began *moving*.

Маховое колесо начало *двигаться*.

3) деепричастием:

After *closing* the circuit we measured the resistance.

Замкнув цепь, мы измерили сопротивление.

4) глаголом в личной форме в придаточном предложении:

I remember of their *having adopted* this system as being more economical.

Я помню, что они *одобрили* эту систему как более экономичную.

9. Герундиальный оборот (The Gerundial Construction) и его перевод

Действие или состояние, выраженное герундием, может иметь свой субъект. В этом случае перед герундием всегда стоит: существительное в притяжательном падеже или притяжательное местоимение, или существительное в общем падеже. Такие герундиальные обороты переводятся придаточным предложением с союзом *что (чтобы)* с предшествующим ему местоимением *то*. Герундий передается личной формой глагола в функции сказуемого этого придаточного предложения, а стоящее перед ним существительное или местоимение — существительным (местоимением) в именительном падеже в функции подлежащего. Переводить герундий отглагольным существительным всегда легче, но иногда невозможно.

Dr. Brown's being absent was very strange.

Отсутствие д-ра Брауна было очень странно.

То, что д-р Браун отсутствовал, было очень странно.

Если герундий имеет форму страдательного залога, то стоящее перед ним существительное (или местоимение) является объектом действия, выраженного герундием. При переводе это существительное или местоимение становится дополнением того придаточного предложения, которое соответствует английскому герундиальному обороту:

He insisted *on my being examined* by a physician.

Он настаивал *на том, чтобы меня осмотрел* врач.

Иногда перед герундием нет ни существительного, ни местоимения. Такие герундиальные обороты часто удобно перевести придаточным предложением с союзом *что* с предшествующим ему местоимением *то*. Подлежащим придаточного предложения будет тот член английского предложения, к которому относится действие или состояние, выраженное герундием, т. е. чаще всего – английское подлежащее, реже – дополнение. Герундий переводится личной формой глагола в функции сказуемого придаточного предложения:

In spite of not having any university education, Faraday made his great discoveries.

Несмотря на то, что у Фарадея не было университетского образования, он сделал свои великие открытия.

10. Отглагольное существительное (The Verbal Noun), его признаки и перевод

Отглагольное существительное по форме сходно с простым герундием, но, в отличие от него, не имеет никаких глагольных признаков.

Основными (хотя и не всегда присутствующими) внешними показателями отглагольного существительного в предложении являются:

1) артикль:

They started **the loading** of the ship.

Они начали **загрузку** корабля.

2) наличие предлога *of* перед следующим существительным:

The boiling of the mixture continued for two hours.

Кипячение смеси продолжалось два часа.

3) наличие перед ним прилагательного:

I heard a loud **talking**.

Я услышал громкий **разговор**.

4) окончание множественного числа *-s*:

All the **sittings** of the Committee were over.

Все **заседания** комитета закончились.

Отглагольное существительное выполняет все функции, присущие обычному существительному и на русский язык переводится существительным.

11. Местоимения-заместители (*it, one, that*) и их перевод

В английском языке местоимения *it, one, that* в предложении могут выполнять различные функции, от которых зависит их перевод на русский язык.

Местоимение *it* в предложении чаще всего выступает как:

1) местоимение, заменяющее предшествующее существительное или целое высказывание:

I have read your paper and found **it** very interesting.

Я читал вашу статью и нашел **ее** очень интересной (нашел, что **она** очень интересна).

The temperature is rising slowly. **It** means that...

Температура медленно поднимается. **Это** означает, что...

2) местоимение, предворяющее последующее высказывание, выраженное инфинитивом, реже герундием или придаточным предложением с союзами *that, why* и др. В этом случае на русский язык местоимение *it* никак не переводится:

In ancient times **it** was believed that the earth was flat.

В древности думали, что земля плоская.

I found **it** easy to understand the speaker.

Мне было легко понимать докладчика.

3) указательное местоимение *it* переводится местоимением *это*:

What is *it*? – *It* is a table.

Что *это*? – *Это* стол.

One употребляется как:

1) числительное и переводится числительным *один*:

There is only *one* solution of this problem.

Есть только *одно* решение этой проблемы.

2) неопределенное местоимение. В этом случае предложение с местоимением *one* переводится безличным предложением:

One should know how to apply this method in engineering.

Необходимо знать, как применять этот метод в технике.

3) заместитель ранее стоящего существительного. Переводится тем существительным, которое замещает, или опускается:

The method is a conventional *one*.

Этот метод общепринят (является общепринятым *методом*).

That (those) употребляется как:

1) указательное местоимение и переводится местоимением *том (me)*:

Give me *that* pencil please.

Дай мне *том* карандаш, пожалуйста.

2) союз и переводится русским союзом *что*:

He showed that any two masses attract each other.

Он доказал, что любые два тела, имеющие массу, притягиваются.

3) союзное слово и переводится *который*:

Mechanics studies motion and the forces *that* cause it.

Механика изучает движение и силы, *которые* являются его причиной.

4) слово-заместитель *that (those)*, которое заменяет ранее стоящее существительное и переводится тем существительным, которое оно замещает, или опускается:

The atomic weight of oxygen is greater than *that* of carbon.

Атомный вес водорода больше (*атомного веса*) углерода.

12. Многофункциональные служебные слова (*after, before, like, still, for, only, but, as, since, so*) и их перевод

Следующие широко употребляемые служебные слова обладают способностью выполнять различные функции в предложении:

after:

а) наречие времени *потом, затем, впоследствии* (обычно ставится в конце предложения):

I have never met him *after*.

Я никогда не встречал его *впоследствии*.

б) предлог времени и места *после, по, за, вслед за*:

After the Great Patriotic War our industry overshot the pre-war level.

После Великой Отечественной войны наша промышленность превысила довоенный уровень.

в) подчинительный союз *после; после того, как* (вводит придаточное предложение времени):

We have completed the rehabilitation of our ruined cities *after* the war was ended.

Мы завершили восстановление наших разрушенных городов *после того, как* окончилась война.

before:

а) наречие времени *раньше, прежде* (обычно ставится в конце предложения):

I have never seen him *before*.

Я его никогда *раньше* не видел.

б) предлог времени и места *до, раньше, перед, впереди*:

Japan is stronger now than it was *before* the war.

Япония сейчас сильнее, чем она была *до* войны.

в) подчинительный союз *до того, как; прежде чем*:

We had to make a number of experiments *before* we achieved satisfactory results.

Нам пришлось произвести ряд опытов, *прежде чем* мы добились удовлетворительных результатов.

like:

а) наречие *как, подобно (unlike в отличие от)*:

Radio waves travel *like* waves of water.

Радиоволны распространяются *подобно* волнам воды.

Unlike oxygen, hydrogen is seldom found free in nature.

В отличие от кислорода, водород редко встречается в природе в чистом виде.

б) прилагательное *похожий, сходный, подобный*:

Some liquids have *like* properties.

Некоторые жидкости имеют *схожие* свойства.

в) глагол *любить, нравиться*:

We *like* technicolour films.

Нам *нравятся* цветные фильмы.

still:

а) наречие времени *все еще, еще, по-прежнему*:

There is **still** some water in the container.

В сосуде **все еще** имеется некоторое количество воды.

б) соединительное, наречие *все же, тем не менее, однако*:

Nitroglycerine is a dangerous explosive, **still** it is used in medicine.

Нитроглицерин является опасным взрывчатым веществом, **тем не менее**, он применяется в медицине.

в) прилагательное *тихий, спокойный*:

The sea is very **still** today.

Море сегодня очень **спокойное**.

for:

а) предлог *для, за*:

One law **for** the rich and another **for** the poor.

Один закон **для** богатых, а другой **для** бедных.

с) предлог *в течение*:

She studied law **for** some time.

В течение некоторого времени она изучала юриспруденцию.

в) подчинительный союз *так как, ибо, потому что* (обычно ему предшествует запятая):

Put on some warm things, **for** it is bitterly cold to-day.

Оденьтесь потеплее, **так как** сегодня очень холодно.

only:

а) наречие *только, исключительно*:

Only you can do it.

Только вы можете это сделать.

б) союз *но*:

He could do it, **only** he is too busy.

Он бы мог сделать это, **но** он слишком занят.

в) прилагательное *единственный* (употребляется всегда с артиклем или его заменителем):

Hydrogen is **the only** element containing one electron

Водород **единственный** элемент, содержащий один электрон.

He is my **only** friend.

Он мой **единственный** друг.

but:

а) соединительный союз *но*:

Kinetic energy is the energy of motion, **but** potential energy is that of position.

Кинетическая энергия – это энергия движения, **а** потенциальная – энергия покоя.

б) предлог *кроме, за исключением*:

All the problems are settled **but** one.

Все вопросы решены **кроме** одного.

в) наречие *только, лишь*:

There remains **but** one unsettled question.

Остается **лишь** один нерешенный вопрос.

as:

а) подчинительный союз причины *так как, ибо*:

This substance does not exist in a pure state **as** it is unstable.

Это вещество не встречается в чистом виде, **ибо** оно нестойкое.

б) подчинительный союз времени *когда; в то время как; по мере того как*:

The viscosity of a liquid decreases **as** the temperature rises.

Вязкость жидкости уменьшается, **по мере того как** поднимается температура.

в) наречие *как*:

I did it **as** you told me to do.

Я сделал это, **как** вы мне сказали.

since:

а) предлог времени *с, после*:

I haven't seen him **since** last year.

Я не видел его **с** прошлого года

б) наречие времени *с тех пор, тому назад* (обычно ставится в конце предложения):

I have not seen him **since**.

Я не видел его **с тех пор**.

в) подчинительный союз *так как; с тех пор, как*:

He could not come **since** he was ill.

Он не смог прийти, **так как** был болен.

It is a week **since** I saw him last.

Прошла неделя **с тех пор, как** я видел его последний раз.

so:

а) наречие следствия *так, таким образом, настолько*:

I was **so** tired that I went to bed at once.

Я был **так** утомлен, что сразу же лег спать.

б) наречие причины *поэтому, итак*:

It was late, **so** I went to bed at once.

Было поздно, **поэтому** я сразу же лег спать.

13. Сравнительные конструкции **as...as, not so (as, such a)...as, than** и их перевод

В научно-технических текстах довольно часто встречаются следующие сравнительные конструкции:

As...as – союз, вводящий обстоятельственное придаточное предложение сравнения (предметы или лица имеют одинаковую степень какого-либо качества).

This method is *as* effective *as* the previous one.

Этот метод *такой же (настолько же)* эффективный *как и* предыдущий.

Not so (as, such a)...as, than – используется, когда предметы или лица имеют неодинаковую степень какого-либо качества.

Water is *not such a* good conductor *as* metal.

Вода *не такой (не настолько)* хороший проводник, *как* металл.

The Pacific is much more dangerous *than* the Atlantic.

Тихий океан намного опаснее Атлантического (*чем* Атлантический).

Для сравнения также используются выражения типа *twice as...as, three times as...as* и др.

The grass was *twice as* tall *as* in the rest in the field.

Трава была *в два раза* выше, *чем* в остальной части поля.

14. Предложные обороты (The Prepositional Phrases)

Широкое распространение в научно-техническом языке имеют следующие предложные обороты:

according to – согласно с

in accordance with – в соответствии с, по

According to official figures there are several million unemployed in Russia.

По официальным данным в России несколько миллионов безработных.

In accordance with its peaceful policy the Bulgaria always advocates peaceful means for settling international disputes.

В соответствии со своей мирной политикой, Болгария всегда стоит за использование мирных средств для урегулирования международных спорных вопросов.

as to – что касается

As to power development in the USSR, it was conducted on planned lines.

Что касается развития энергетики в СССР, то она осуществлялась в плановом порядке.

because of – из-за, вследствие

Because of hard ice conditions expedition had to winter in the Arctic.

Из-за тяжелых ледовых условий экспедиция была вынуждена зимовать в Арктике.

by means of – посредством, при помощи

By means of free market we hoped to increase productivity of our factories and works.

При помощи свободного рынка мы надеялись повысить производительность наших фабрик и заводов.

due to – благодаря, из-за, вследствие

We can communicate over long distances *due to* invention of the radio.

Мы можем осуществлять связь на больших расстояниях, *благодаря* изобретению радио.

owing to – по причине, вследствие, из-за

Owing to the bad weather the ship was two days behind the schedule.

Вследствие плохой погоды корабль опоздал на два дня.

in case (of) – в случае

In case of need we shall all go to defend our country.

В случае необходимости мы все встанем на защиту нашей страны.

in spite of, despite – несмотря на

In spite of all efforts at improvement, the efficiency of heat engine remains low.

Несмотря на все попытки усовершенствования, эффективность теплового двигателя остается низкой.

Despite all difficulties scientists succeeded in harnessing atomic energy.

Несмотря на все трудности, ученым удалось овладеть атомной энергией.

instead of – вместо

Instead of carrying out international agreements certain nations are violating them.

Вместо выполнения международных соглашений, некоторые страны нарушают их.

thanks to – благодаря

Thanks to invention of the SATCOM ships can be tracked everywhere in the ocean.

Благодаря изобретению спутниковой связи, нахождение кораблей можно отслеживать в любом месте океана.

15. Союзные обороты (The Conjunctional Phrases)

Наиболее часто в научно-технических текстах встречаются следующие союзные обороты:

as ... as ... – так же, как (и)

Water is *as* necessary for life *as* air.

Вода *так же* необходима для жизни, *как и* воздух.

not so ... as ... – не так ..., как

The gale was *not so* severe *as* I thought.

Шторм был *не так, как* я предполагал.

as far as – насколько, до

As far as I know oxygen is a colourless gas.

Насколько я знаю, кислород бесцветный газ.

as long as – пока

We are strong *as long as* we are united.

Мы сильны, *пока* мы едины.

as soon as – как только

Open the circuit *as soon as* you notice a spark.

Разомкните цепь, *как только* заметите вспышку

as well as – так же, как и; как ... так и

In the atomic nucleus there are forces of attraction between protons *as well as* between neutrons.

В ядре атома имеются силы притяжения, *как* между протонами, *так и* между нейтронами.

both ... and ... – как, так и...; и... и...

We build new schools *both* in cities *and* in the country.

Мы строим новые школы, *как* в городах, *так и* в деревне.

either ... or ... – или ..., или ...

In radio communication we use *either* short *or* long waves.

В радиосвязи мы применяем *или* короткие, *или* длинные волны.

in order to (that) – для того, чтобы

Modern criminal prefers to manage computer *in order to* carry out its plan to knock over a bank.

Современный преступник предпочитает компьютер *для того, чтобы* выполнить план ограбления банка.

neither ... nor ... – ни ... , ни ...

Neither bombs *nor* shells could break the spirit of the Egyptians during the Yom-Kippur war.

Ни бомбы, *ни* снаряды не смогли сломить дух египтян во время шестидневной войны.

the ... the ... – чем ... тем ...

The higher the temperature of the air, *the* greater is the velocity of a sound.

Чем выше температура воздуха, *тем* больше скорость звука.

Наряду с союзами существует ряд слов и словосочетаний, которые служат для связи отдельных частей высказывания, то есть выполняют ту же функцию, что и союзы. Знание этих слов помогает проследить логическую последовательность изложения.

В зависимости от значения эти средства связи можно разделить на несколько групп:

1. Средства связи, указывающие на порядковую последовательность мыслей и действий:

- *first, at first, first of all, in the beginning, to begin with* – во-первых, сначала, прежде всего;
- *second, secondly* – во-вторых;
- *next, further, then* – далее, затем;
- *finally, lastly, at last* – (и) наконец.

2. Средства связи, выражающие присоединение к высказыванию, то есть присоединяющие к предшествующему высказыванию новое предложение, которое содержит дополнительные замечания или мысль:

- *in addition* – кроме того, в дополнение к сказанному;
- *moreover, furthermore* – более того, далее, к тому же;
- *likewise, similarly, besides, now* – точно также, кроме этого, итак.

3. Средства связи, выражающие противопоставление:

- *however, still, yet, nevertheless* – однако, все же, тем не менее;
- *on the contrary, conversely, alternately* – наоборот, напротив, в противоположность этому;
- *otherwise, rather* – иначе, в противном случае;
- *on the one hand, on the other hand* – с одной стороны, с другой стороны.

16. Сослагательное наклонение (The Subjunctive Mood), условные предложения и их перевод

Сослагательное наклонение выражает действие, которое говорящий рассматривает как предполагаемое или желательное. Сослагательное наклонение используется в тех случаях, когда выражаются: сомнение, неуверенность, предположение, обусловленность или приказание, совет, требование, чувство радости или сожаления.

В английском языке имеются аналитические и синтетические формы сослагательного наклонения:

		Синтетическая	Аналитическая
Present Subjunctive	<i>I, he, she, it, we, you, they</i>	<i>be</i> <i>ask</i>	
Past Subjunctive	<i>I, he, she, it, we, you, they</i>	<i>were</i> <i>asked</i>	<i>should/would</i> + <i>Indefinite Infinitive</i>

Perfect Subjunctive	<i>I, he, she, it, we, you, they</i>	<i>had been had asked</i>	<i>should/would + Perfect Infinitive</i>
---------------------	--------------------------------------	---------------------------	--

Формы *Present Subjunctive* и *Past Subjunctive* относят действие к настоящему или будущему периоду времени, а форма *Perfect Subjunctive* относит действие к прошедшему периоду времени.

Сослагательное наклонение употребляется:

1) в придаточных предложениях после безличных предложений типа *it is necessary*, которые выражают необходимость совершения действия. Наиболее часто сослагательное наклонение употребляется после следующих безличных предложений: *it is necessary* – необходимо; *it is required* – необходимо; *it is important* – важно; *it is desirable* – желательно; *it is surprising* – странно, удивительно; *it is (un)likely* – (мало)вероятно; *it is probable* – вероятно.

It is important that the law be observed.

Важно, чтобы закон соблюдался.

2) в придаточных предложениях после глаголов, выражающих приказ, предложение, пожелание: *to advise* – советовать; *to demand* – требовать; *to order* – приказывать; *to propose* – предлагать; *to request* – просить, предлагать; *to require* – приказывать, требовать; *to suggest* – предлагать, предполагать; *to suppose* – предполагать; *to want* – хотеть; *to wish* – хотеть, желать.

He ***advised*** that the students ***should read*** this book.

Он **советовал**, чтобы студенты **прочли** эту книгу.

3) в условных предложениях с союзами и союзными словами *if, unless, provided (that), on condition (that), in case (that)* и др.:

If they came, he ***would be*** glad.

Если бы они пришли, он **был бы** рад.

4) в бессоюзных условных предложениях при обратном порядке слов (инверсии):

Had I met him yesterday, I ***should have told*** him about it.

Если бы я встретил его вчера, я **сказал бы** ему об этом.

В английском языке существуют три основных типа условных предложений.

Условные предложения I типа

Условие, содержащееся в условном придаточном предложении, рассматривается говорящим как реально предполагаемый факт, относящийся к настоящему, прошедшему или будущему временам. Сказуемые главного и придаточного предложений выражаются глаголами в формах изъявительного наклонения.

If the weather *is* nice, we *go* for a walk.

Если погода хорошая, мы *ходим* на прогулку.

If the weather *is* nice, we *'ll go* for a walk.

Если погода *будет* хорошая, мы *пойдем* на прогулку.

Условные предложения II типа

Условие, содержащееся в условном придаточном предложении, рассматривается говорящим как маловероятное. Для выражения малой вероятности осуществления действия в настоящем или будущем временах сказуемое главного предложения употребляется в форме сослагательного наклонения *should/would* + *Indefinite Infinitive* без *to*, а сказуемое придаточного предложения – в форме сослагательного наклонения, аналогичной *Past Indefinite* или *were* для всех лиц от глагола *to be*.

If he *were* free, he *would do* it.

Если *бы* он *был* свободен, он *бы* это *сделал*.

Условные предложения III типа

Условие, содержащееся в условном придаточном предложении, рассматривается говорящим как неосуществимое, так как относится к прошлому времени. Сказуемое главного предложения употребляется в форме сослагательного наклонения *should/would* + *Perfect Infinitive*, а сказуемое придаточного предложения в форме сослагательного наклонения, аналогичной *Past Perfect*.

I *should not have been* late yesterday, if my watch *had been* right.

Я *бы не опоздал* вчера, если *бы* мои часы *шли* правильно.

Все формы сослагательного наклонения имеют в английском языке, в основном, одинаковые значения и могут переводиться:

1) глаголом сослагательного наклонения с частицей «бы»:

The experiment *would have been* a failure if he *had not taken* the necessary measures in time.

Эксперимент *провалился бы*, если *бы* он вовремя *не предпринял* необходимые меры.

2) инфинитивом:

If metal *were heated* the electrons would move faster.

Если металл *нагреть*, электроны будут двигаться быстрее.

17. Анализ и перевод простого предложения

Основным средством полного и правильного понимания английского текста является лексико-грамматический анализ предложения, с помощью которого устанавливается синтаксическое членение предложения и определяется принадлежность слов к той или иной части речи.

Рассмотрим технику анализа простого предложения.

Структура предложения

В английском языке почти нет грамматических окончаний, и одним из основных средств определения синтаксической функции слова является место, занимаемое им в предложении. Поэтому в языке установился твердый порядок слов, основным принципом которого является следующее расположение: подлежащее, сказуемое, дополнение, например:

The reaction causes ignition.

Реакция вызывает воспламенение.

Изменение порядка слов влечет за собой коренное изменение смысла высказывания:

Ignition causes the reaction.

Воспламенение вызывает реакцию.

Порядок слов повествовательного предложения

В английском повествовательном предложении установился следующий твердый порядок слов. Исключения составляют случаи инверсии, которые изложены ниже.

Первое место – группа подлежащего (грамматическое подлежащее с поясняющими словами).

Второе место – группа сказуемого (грамматическое сказуемое с поясняющими словами).

Третье место – группа дополнения (грамматическое дополнение с поясняющими словами).

Четвертое место – обстоятельства (образа действия, места, времени и др.).

Обстоятельство, выраженное наречием, может занимать различные места в предложении:

Определение не имеет фиксированного места в предложении и входит в состав той синтаксической группы, с которой оно логически связано. Определение может стоять как слева от определяемого слова (левое определение) так и справа от него (правое определение). Левое определение встречается чаще; оно обычно выражается местоимением, прилагательным или причастием:

our industry – *наша* промышленность;

the *electrical* current – *электрический* ток;

the *boiling* liquid – *кипящая* жидкость.

Правое определение может быть выражено группой слов с предлогом (*of, for, in, to, through*), причастным оборотом, инфинитивом, герундием с предлогом и придаточным предложением:

the temperature *of the body* – температура *тела*;

the current *flowing in the conductor* – ток, *проходящий в проводнике*;

the experiment *to be done* – опыт, *который надо произвести*;

the device *for closing the circuit* - прибор для включения *электроцепи*;

the electrons *which are revolving round the nucleus* – электроны, *которые вращаются вокруг ядра*.

Перевод незнакомого предложения нужно делать не в произвольном порядке, а начиная с главных членов предложения, содержащих основную мысль: с подлежащего и сказуемого. Затем надо переводить дополнение и в последнюю очередь – обстоятельство.

18. Анализ и перевод сложного предложения

Сложное предложение состоит из двух или нескольких простых предложений, выражающих одну общую мысль. Простые предложения, входящие в состав сложного, соединяются или по способу сочинения, или по способу подчинения.

Прежде чем переводить первое предложение текста нужно установить простое оно или сложное.

Признаками сложного предложения являются:

1) наличие более чем одного подлежащего и связанного с ним сказуемого.

2) наличие сочинительных и подчинительных союзов (союзных слов) между предложениями.

3) наличие в некоторых случаях знаков препинания, отделяющих одно предложение от другого.

Сочинительные союзы: *and* – и, а; *but* – но, а; *or* – или; *still*, *yet*, *however* – тем не менее, однако; *therefore* – поэтому; *while* – тогда как.

Подчинительные союзы (союзные слова): *after* – после того, как; *although (though)* – хотя; *as* – так как; *because* – потому что; *before* – до того как; прежде чем; *for* – так как, ибо; *how* – как; *if* – если (бы); *in order to* – для того, чтобы; *till (until)* – до тех пор, пока ... не; *since* – так как, ибо; с тех пор, как; *than* – чем; *that* – то, что; *what* – что; то что; *when* – когда; *where* – где; куда; там, где; *which* – который; *while* – пока; в то время как; *who* – кто; который.

Схема анализа сложного предложения будет примерно следующей:

1. Установить, что предложение сложное путем нахождения грамматических подлежащих и согласованных с ними сказуемых.

2. Найти все служебные слова, соединяющие предложения и, учитывая знаки препинания, разбить сложное предложение на простые.

3. Учитывая характер соединительных слов, определить тип сложного предложения; найти главное и придаточные предложения.

4. Произвести анализ и перевод главного, а затем придаточных предложений.

Определительные придаточные предложения, вводимые относительными местоимениями *whom*, *which* и *that* могут присоединяться к главному предложению бессоюзным способом, если эти местоимения не выполняют функции подлежащего.

В русском языке подобное бессоюзное подчинение невозможно и, поэтому, при переводе следует восстановить соответствующее относительное местоимение:

The problem he was working at had a great significance for our industry.

Проблема, над **которой** он работал, имела большое значение для нашей промышленности.

19. Передача артикля (The Article) при переводе

В современном английском языке существует два артикля: неопределенный *a (an)* и определенный *the*.

Артикль – особое служебное слово, которое употребляется перед существительными. В большинстве случаев артикли не переводятся на русский язык. Однако в отдельных случаях необходимо учитывать значение артикля и выражать его лексическими или другими способами.

1. Определенный артикль *the* исторически произошел от указательного местоимения *that*, поэтому при необходимости он переводится указательным местоимением.

This is **the** device that was improved in our laboratory.

Это **то** устройство, которое было усовершенствовано в нашей лаборатории.

2. В конструкциях типа *the soon, the better, the great, the higher – the* не является артиклем, в этом случае *the* – наречие или союз, который необходимо переводить.

The more we learn **the more** we know.

Чем больше мы учимся, **тем больше** мы знаем.

3. Определенный артикль *the* употребляется в следующих устойчивых выражениях:

on the whole – в целом, в общем, в конце концов;

in the words of – говоря словами, по выражению (кого-либо);

on the one hand – с одной стороны;
on the other hand – с другой стороны;
the long and the short of it – короче говоря, одним словом;
etc.

Неопределенный артикль *a (an)* происходит от староанглийского *one* – один, переводится при необходимости словами *один, какой-то* и др.

Неопределенный артикль употребляется:

1. В классификационной функции, т.е. показывает принадлежность предмета к тому или иному классу или его качественный признак. В таком случае, как правило, переводится словами *такой, такого вида*.

The only sensible solution in the Middle East is *a* peace which would withdraw Israeli troops.

Единственно разумное решение ближневосточной проблемы – это *такой* мир, который вывел бы израильские войска.

2. Перед собственными существительными (имя, фамилия, географическое название) в единственном числе, чтобы показать, что это лицо является одним из членов этой семьи. На русский язык переводится словом *какой-то, некий*.

He was introduced to *a* Mr. Black.

Его познакомили с *неким* мистером Блэком.

3. Неопределенный артикль употребляется в следующих устойчивых словосочетаниях:

it's a deal – договорились;

in a few words – в нескольких словах, вкратце;

as a result – в результате;

it is a pity – жаль;

it is a pleasure – приятно;

in a/one word – одним словом;

etc.

V. ЛЕКСИЧЕСКИЕ ОСНОВЫ ПЕРЕВОДА

1. Термины (The Terms) и приемы их перевода на русский язык

Термином мы называем эмоционально-нейтральное слово (словосочетание), передающее название точно определенного понятия, относящегося к той или иной области науки или техники. Терминологическая лексика дает возможность наиболее точно, четко и экономно излагать содержание данного предмета и обеспечивает правильное понимание существа трактуемого вопроса. Основным требованием, предъявляемым к термину становится однозначность. Фактически далеко не все термины

удовлетворяют этому требованию даже в пределах одной специальности, например:

engine – машина, двигатель, паровоз;

oil – масло, смазочный материал, нефть.

В структурном отношении все термины можно классифицировать следующим образом:

1. Простые термины типа: *oxygen, resistance, velocity*.

2. Сложные термины, образованные путем словосложения.

Составные части такого термина часто соединяются с помощью соединительного гласного:

gas + meter = gasometer

turbine + generator = turbogenerator

3. Словосочетания, компоненты которых находятся в атрибутивной связи, т.е. один из компонентов определяет другой:

direct current – постоянный ток

barium peroxide – перекись бария

4. Аббревиатура, т.е. буквенное сокращение словосочетаний:

e.m.f. = *electromotive force* – электродвижущая сила

5. Слоговые сокращения, превратившиеся в самостоятельные слова:

radar (radio detection and ranging) – радиолокация

modem (modulator-demodulator) – модем

6. Литерные термины, в которых атрибутивная роль поручается определенной букве:

T-antenna – Т-образная антенна

X-rays – рентгеновские лучи

При переводе терминов мы можем встретиться со следующими моментами:

1. Часть терминов, имеющих международный характер, передается путем транслитерации и не нуждается в переводе:

antenna – антенна

feeder – фидер

2. Некоторые термины имеют прямые соответствия в русском языке и передаются соответствующими эквивалентами:

hydrogen – водород

voltage – напряжение

3. Известная часть терминов при переводе калькируется, т.е. передается с помощью русских слов и выражений, дословно воспроизводящих слова и выражения английского языка:

single-needle instrument – однострелочный аппарат

superpower system – сверхмощная система

4. Нередко случается, что словарь не дает прямого соответствия английскому термину. В этом случае переводчик должен прибегнуть к описательному переводу:

combustion furnace – печь для органического анализа

wall beam – балка, уложенная вдоль поперечной стены

Значительные трудности при переводе вызывают термины, в состав которых входят группы слов, так называемые многокомпонентные термины. Перевод таких терминов обычно начинают с перевода существительного, которое является основным компонентом, потом последовательно переводят каждую смысловую группу, чаще всего справа налево.

Absolute spectral response characteristic

2 3 4 1

Характеристика абсолютной спектральной чувствительности

1 2 3 4

Перевод терминов типа «существительное + причастие I (или герундий) + существительное» и «существительное + причастие II + существительное» начинают с перевода существительного:

Tool-setting gage – прибор для (размерной) настройки инструментов

2. Суффиксы и префиксы, наиболее часто употребляемые в научно-технических терминах

Наиболее интенсивное пополнение терминологического состава языка происходит за счет процессов аффиксации, т.е. образование новых однословных терминов путем прибавления к корневым словам префиксов и суффиксов, например:

connection + dis = disconnection – разъединение

Префиксация

Наиболее часто в научно-технической терминологии встречаются следующие префиксы:

pre-

Префикс *pre-* происходит от латинского *prae*, означавшего *перед, впереди*. В английском языке добавление префикса *pre-* используется для передачи идеи опережения по времени или по положению.

predesign – эскизный проект

de-

Префикс *de-* имеет несколько отрицательных значений, основными из которых являются: а) *вниз, ниже*; б) *высвобождение, отключение или отклонение* и в) *отделение, отдаление*.

descent – спуск, снижение

inter-

Префикс *inter-* происходит от латинского слова *inter*, означавшего *между, среди*.

interchangeability – взаимозаменяемость

un-

Основным значением префикса *un* является *не*. В некоторых случаях префикс *un-* означает изменение действия глагола на обратное.

undrainable – несливаемое (топливо)

unload – разгружать

re-

Широко используемый префикс *re* имеет значение *назад, снова, еще раз*.

recoverable – спасаемый, многократного применения

reentry – повторный вход

trans-

Trans- означает *через, за пределами*.

transition – переход

non-

Non- является отрицательным префиксом, означающим *не*.

nonadjustable – нерегулируемый

mis-

Префикс *mis-* означает *неправильно, ошибочно*.

misfire – незапуск двигателя

ex-

Основными значениями *ex-* является *вне, за пределами*, а также *бывший*.

expulsion – выталкивание, вытеснение

dis-

Префикс *dis-* имеет значение *нет* и *раздельно, отдельно*.

disconnect – разъединение

in-

In- имеет два различных значения – *нет* и *в, заключать в себе*. Буква *n* обычно ассимилируется перед корневым словом, начинающимся с *r*, в результате чего появляется префиксная форма *ir-*. По той же причине перед буквами *t*, *p*, *b* префикс *in-* переходит в форму *im-*.

inaccessible – не имеющий доступа

sub-

Префикс *sub-* имеет значение *под, до, ниже по положению*, а также *в меньшей степени, чем, ниже*.

subassembly – узел агрегата

Суффиксация

Ниже приведены наиболее часто употребляемые суффиксы английского языка:

а) существительные, обозначающие лицо, механизм или агрегат, производящие определенное действие

<i>-er</i>	<i>rig</i> /испытательный стенд	<i>rigger</i> /механик по сборке
<i>-or</i>	<i>to combust</i> /сжигать	<i>combustor</i> /устройство сжигания топлива
<i>-ent</i>	<i>to absorb</i> /поглощать	<i>absorbent</i> /поглотитель
<i>-ant</i>	<i>to propel</i> /приводить в движение	<i>propellant</i> /ракетное топливо

б) существительные, выражающие некоторые понятия

<i>-ion</i>	<i>to ablate</i> /охлаждать путем уноса массы	<i>ablation</i> /унос массы
<i>-ation</i>	<i>to identify</i> /определять	<i>identification</i> /идентификация
<i>-ment</i>	<i>to procure</i> /закупать по безнал. расчету	<i>procurement</i> /закупки по безнал. расчету
<i>-ure</i>	<i>to expose</i> /подвергать воздействию	<i>exposure</i> /воздействие
<i>-age</i>	<i>to pass</i> /проходить	<i>passage</i> /газовый канал
<i>-ing</i>	<i>to feather</i> /ставить во флюгер	<i>feathering</i> /флюгирование
<i>-ance</i>	<i>to clear</i> /давать разрешение	<i>clearance</i> /зазор
<i>-ence</i>	<i>to infer</i> /делать вывод	<i>inference</i> /следствие

в) отвлеченные существительные, образующиеся от прилагательных

<i>-ism</i>	<i>formal</i> /формальный	<i>formalism</i> /математическое представление
<i>-ty</i>	<i>safe</i> /безопасный	<i>safety</i> /безопасность
<i>-ity</i>	<i>continuous</i> /непрерывный	<i>continuity</i> /непрерывность
<i>-ness</i>	<i>hard</i> /твердый	<i>hardness</i> /твердость
<i>-ancy</i>	<i>buoyant</i> /плавучий	<i>buoyancy</i> /плавучесть
<i>-ency</i>	<i>frequent</i> /частый	<i>frequency</i> /частота

г) прилагательные, образуемые от глаголов, играющие роль определений

<i>-ive</i>	<i>to interact</i> /взаимодействовать	<i>interactive</i> /взаимодействующий
<i>-able</i>	<i>to reuse</i> /повторно использовать	<i>reusable</i> /повторно используемый
<i>-ible</i>	<i>to convert</i> /переоборудовать	<i>convertible</i> /переоборудуемый
<i>-uble</i>	<i>to solve</i> /решать	<i>soluble</i> /разрешимый
<i>-ent</i>	<i>to converge</i> /сужаться	<i>convergent</i> /сужающийся
<i>-ant</i>	<i>to resonate</i> /резонировать	<i>resonant</i> /работающий в

режиме резонанса

д) прилагательные, образуемые от существительных, играющие роль определений

-y	<i>grain</i> /элемент заряда	<i>grainy</i> /зернистый
-al	<i>computation</i> /вычисление	<i>computational</i> /вычислительный
-ic	<i>system</i> /система	<i>systemic</i> /системный
-ical	<i>identity</i> /тождество	<i>identical</i> /тождественный
-ous	<i>danger</i> /опасность	<i>dangerous</i> /опасный
-ious	<i>space</i> /пространство	<i>spacious</i> /объемный
-ary	<i>element</i> /элемент	<i>elementary</i> /элементарная
-less	<i>spar</i> /лонжерон	<i>sparless</i> /безлонжеронный
-proof	<i>water</i> /вода	<i>waterproof</i> /водонепроницаемый
-ar	<i>pole</i> /полюс	<i>polar</i> /полярный
-ful	<i>meaning</i> /смысл	<i>meaningful</i> /значащий

3. Выбор лексического варианта

Одной из основных задач при работе над английским текстом является отыскание в русском языке соответствий для переводимых английских слов.

Первый этап этой работы состоит в определении принадлежности незнакомого слова к той или иной части речи с помощью грамматического анализа. После этого задача сводится к отысканию в словаре лексического соответствия под определенной словарной пометой.

Часть английских слов имеет русские эквиваленты, т. е. постоянные лексические соответствия, точно совпадающие со значением переводимого слова и не зависящие от контекста. Чаще всего эквиваленты находятся в области терминологической лексики, например:

oxygen – кислород

ion – ион

Нужно, однако, иметь в виду, что для большинства английских слов словарь приводит целый ряд аналогов, из которых требуется выбрать наиболее подходящий по значению. Так, например, для слова *test* в функции существительного словарь дает следующий ряд аналогов: *испытание, мерило, критерий, исследование, проба анализ, реакция, реактив, контрольная работа*

Очевидно, что выбор наиболее подходящего значения из такого ряда аналогов может быть сделан только на основе контекста. Для раскрытия значения английского слова обычно

бывает достаточно узкого контекста, т. е. ближайшего лексического окружения слова в пределах одного предложения.

Рассмотрим для примера несколько предложений, содержащих слово *test*:

This theory could not stand the *test* of time and was finally abandoned at the end of the 18th century.

Эта теория не смогла выдержать *испытания* временем и к концу 18 века была окончательно оставлена.

A solution of barytes represents a most delicate *test* for detecting the presence of carbon dioxide.

Раствор барита является чрезвычайно чувствительным *реактивом* для определения присутствия двуокиси углерода.

The *test* offered to the students contained several sentences for translation.

Контрольная работа, данная студентам, содержала несколько предложений для перевода.

В некоторых случаях, при отсутствии подходящих аналогов, приходится прибегать к описательному переводу, т.е. к свободной передаче смыслового содержания переводимого слова или словосочетания, например:

hydraulic water - вода, поступающая в гидравлический классификатор

energy factor - коэффициент остроты настройки

4. Изменение значения слов

Следующие слова имеют особенности важные для перевода: не изменяя своей формы, они могут выполнять функции прилагательного и наречия. Принимая же суффикс наречия *-ly*, они приобретают новый смысл.

Hard

а) прилагательное *трудный, тяжелый, твердый*:

The operation was very *hard*, but successful.

Операция была очень *трудной*, но успешной.

б) наречие *с трудом, усиленно, тяжело*:

They worked *hard* and achieved good results.

Они *усиленно* работали и добились хороших результатов

в) наречие *hardly* *едва, едва ли, с трудом*:

They can *hardly* do it without our help.

Они *едва ли* могут сделать это без нашей помощи.

Near

а) прилагательное *близкий*:

I should like to have a *near* translation of Byron's poems.

Мне бы хотелось иметь **точный (близкий)** перевод поэм Байрона.

б) наречие *близко*:

We came quite **near** to the solution of the problem.

Мы подошли очень **близко** к решению этой проблемы.

в) наречие *nearly почти, приблизительно, близко*:

The masses of a proton and a neutron are **nearly** equal.

Массы протона и нейтрона **почти** равны.

High

а) прилагательное *высокий*:

Multi-storeyed buildings are very **high**.

Многоэтажные дома очень **высоки**.

б) наречие *высоко*:

Jet planes fly **high** up in the sky.

Реактивные самолеты летают **высоко** в небе.

в) наречие *highly весьма, очень*:

It is a **highly** interesting book.

Это **весьма** интересная книга.

Late

а) прилагательное *поздний*:

His **late** arrival caused much inconvenience.

Его **позднее** прибытие вызвало большие затруднения.

б) наречие *поздно*:

The catalyst was added too **late**.

Катализатор был добавлен слишком **поздно**.

в) наречие *lately недавно, за последнее время*:

A balloon has **lately** been reported above this point.

Над этим пунктом **недавно** был замечен воздушный шар.

Short

а) прилагательное *короткий*:

The distance to this point is very **short**.

Расстояние до этого пункта очень **невелико**.

б) наречие *резко, круто, внезапно*:

The motor car stopped **short**.

Автомобиль **внезапно** остановился.

в) наречие *shortly вскоре*:

The ship will **shortly** arrive.

Корабль **вскоре** придет.

Два следующих прилагательных – *large* и *ready* в функции наречия с суффиксом *-ly* меняют свое основное значение:

Large

а) прилагательное *большой, обширный*:

The entrance halls of the Petersburg Metro are *large* and beautiful.

Вестибюли Петербургского метро *просторны* и красивы.

б) наречие *largely* *главным образом, в значительной степени*:

In electrical engineering rubber is used *largely* as the insulating material.

В радиотехнике резина применяется *главным образом* как изоляционный материал.

Ready

а) прилагательное *готовый*:

He is always *ready* to help his friends.

Он всегда *готов* помочь своим друзьям.

б) наречие *readily* *легко, без труда*:

Charcoal *readily* absorbs many gases.

Древесный уголь *легко* абсорбирует многие газы.

5. Адвербиальные обороты (The Adverbial Phrases)

В английских научно-технических текстах наиболее часто встречаются следующие адвербиальные обороты:

any longer – больше не, дольше

When the boiling point is reached, adding heat to the liquid does not raise its temperature *any longer*.

Когда достигнута точка кипения, то дальнейшая подача тепла к жидкости *больше не* повышает ее температуры.

no longer – больше не, дольше

Dry steam is *no longer* a vapour and may be considered as a gas.

Сухой пар *не* является *больше* паром и может рассматриваться как газ.

as a result – в результате, в конце концов:

Lines of force around the conductor appear *as a result* of a current flow through the conductor.

Силовые линии вокруг проводника возникают *в результате* движения тока через проводник.

at all – совсем (употребляется для усиления отрицания)

We detected in this substance no impurities *at all*.

Мы *совсем* не обнаружили примесей в этом веществе.

at first – сначала

The voltage of the a.c. during a cycle *at first* rises and then falls.

Напряжение переменного тока в течение цикла *сначала* повышается, а затем падает.

at last – наконец

We have *at last* penetrated into the secrets of the atom.

Мы, *наконец*, проникли в тайну атома.

at least – по крайней мере:

At least 50 unstable isotopes have been found in nature.

По крайней мере, 50 нестойких изотопов были обнаружены в природе.

at once – сразу, немедленно

The sedimentation ceased *at once*.

Осаждение прекратилось *немедленно*.

at present – в настоящее время, теперь

At present prices have a tendency to go high.

В настоящее время цены постоянно повышаются.

in fact – фактически, в действительности:

In fact, the theoretical efficiency of a heat engine is always far below 100 per cent.

Фактически теоретическая эффективность теплового двигателя всегда значительно ниже 100%.

in this way – таким путем, таким образом

We have raised the temperature and, *in this way*, accelerated the process of evaporation.

Мы подняли температуру, и *таким путем*, ускорили процесс испарения.

6. Интернациональные слова (International Words)

В научно-технической литературе важное место занимают слова, заимствованные из других языков. Эти слова распространились и стали интернациональными.

Интернациональные слова – это лексические единицы, которые имеют структурно-семантическую общность во многих языках: *film, text, visit, doctor, radio, revolution, atom*.

Интернациональная лексика включает слова, которые имеют внешнюю похожую форму и некоторые одинаковые значения в разных языках. Например, слова *accumulator, alpha, energy, element, economic* благодаря своему интернациональному характеру понятны не только носителям английского языка, но и тем, для кого английский является иностранным языком.

В силу того, что интернациональные термины входят в международный фонд научной терминологии, их перевод обычно не вызывает затруднений. Однако, следует учитывать то, что значительная часть интернациональных слов имеют разные значения в английском и русском языках. Поэтому их часто называют «ложными друзьями» переводчика. Например, *activities* – деятельность, но не активность; *resin* – смола, но не резина и т.д.

7. Неологизмы

В практике перевода заметное место занимает проблема перевода неологизмов, т. е. новых слов, появившихся в языке в связи с развитием общественной жизни и возникновением новых понятий. Особенно много неологизмов появляется в научно-техническом языке в результате бурного прогресса науки и техники.

В английском языке примерами неологизмов могут служить слова, появившиеся сравнительно недавно:

televiwer – телезритель

half-life – период полураспада

to dieselize – установить дизель, оборудовать дизелем

Очевидно, что такие слова воспринимаются как неологизмы только до тех пор, пока выражаемые ими понятия не станут привычными, после чего они прочно входят в словарный состав и уже не воспринимаются как новые.

Основными способами образования неологизмов в английском языке являются следующие:

1. Создание новых слов на базе имеющихся в языке продуктивных словообразовательных средств, например, *to dieselize*.

2. Переосмысление уже существующих в языке слов и придание им специального значения. Так, слово *egg* *яйцо* получило в последнее время и специальное значение *авиабомба*.

3. Заимствования из других языков. Заимствование может быть прямым (фонетическим) и калькированием, например:

kolkhoz (прямое заимствование)

collective farm (калька)

4. Сокращения. За последнее время в английском языке усилилась тенденция образовывать новые слова путем сокращения существующих слов или словосочетаний, например:

radar (*radio detection and ranging*)

H-bomb (*hydrogen bomb*)

5. Отыменные глаголы, то есть глаголы, образованные от имен существительных, называющих определенное действие.

plan (*v*) – составлять план, планировать

ship (*v*) – грузить, производить посадку

Значение подобных отыменных новообразований может быть правильно понято только в определенном контексте путем сопоставления со значением исходного существительного, например:

The delegates were ***planed*** to the conference last night.

Глагол *planed* образован от существительного *plane* *самолет*.

Вчера вечером делегаты были *отправлены* на конференцию *самолетом*.

Неологизмы, которые недавно появились в английском языке и отсутствуют в англо-русских словарях, вызывают трудности при переводе. Для правильного перевода неологизмов необходимо проанализировать структуру слова или словосочетания.

Например, в слове *resupply* – префикс *re-* выражает повторение действия, *supply* – запас, снабжать, поставлять, следовательно, *resupply* – пополнение запаса. Одним из позитивных способов перевода является подбор соответствующего аналога в русском языке. Например, *the most favoured nation treatment* – режим наибольшего благоприятствования (*дипл.*).

Второй способ – это перевод путем транскрибирования. Транскрибирование – это передача произношения английского слова русскими буквами. Например, *briefing* – брифинг, *management* – менеджмент, *wind-surfing* – виндсерфинг, *skate-board* – скейтборд.

Третий способ – метод калькирования, или дословного перевода, который состоит в переводе английского слова или выражения путем точного воспроизведения их средствами русского языка. Например, *analog display* – аналоговый дисплей, *rotary engine* – ротационная машина.

8. Сокращения (The Abbreviations)

Употребление сокращенных слов и словосочетаний является широко распространенным явлением в англо-американской научно-технической литературе.

Встречаются три вида сокращений: буквенные сокращения, слоговые сокращения, усеченные слова.

Буквенные сокращения

Буквенные сокращения образуются из начальных букв сокращенных слов и словосочетаний.

Такие инициальные сокращения слов произносятся полностью как исходные слова:

p [*peid*] – страница

c [*kж oud*] – катод

Сокращения словосочетаний произносятся чаще всего по буквам, согласно их алфавитному названию:

e.m.f. [*i: em ef*] = *electromotive force* – электродвижущая сила

T.U.C. [*ti: ju: si:*] = *Trades Union Council* – совет тред-юнионов

В некоторых случаях начальные буквы сокращения сливаются и образуют как бы новое слово, которое произносится в соответствии с английской произносительной нормой:

UNESCO [ju: 'neskou] = *United Nations Educational, Scientific and Cultural Organization*

UNO [ju: nou] = *United Nations Organization*

UFO [ju: fou] = *Unidentified Flying Object*

Среди буквенных сокращений имеется значительная группа сокращенных латинских устойчивых словосочетаний типа:

a.m. [ei em] = *ante meridiem* – до полудня

p.m. [pi: em] = *post meridiem* – после полудня

Некоторые из них превратились лишь в символы, которые при чтении заменяются английским переводом:

i.e. = *id est* – (читается *that is*) то есть

e.g. = *exempli gratia* – (читается *for example*) например и т. д.

В языке имеется также ряд полусокращенных словосочетаний, в которых буквенному сокращению подвергся только первый элемент. При чтении этот сокращенный элемент произносится алфавитным названием данной буквы:

A-bomb ['eibom] = *atomic bomb* – атомная бомба

H-bomb ['et]bom] = *hydrogen bomb* – водородная бомба

Слоговые сокращения

Слоговые сокращения возникают из начальных слогов компонентов словосочетаний. Слоги образуют слитное написание, читающееся как самостоятельное слово:

Benelux ['ben l ks] = *Belgium, Netherlands, Luxemburg* – Бельгия, Нидерланды, Люксембург

Warcor ['wo:k] = *war correspondent* – военный корреспондент

Усеченные слова

При этом способе сокращения может отпадать:

а) начальная часть слова, причем оставшаяся часть читается как новое слово:

chute = *parachute* – парашют

phone = *telephone* – телефон

б) конечная часть слова:

min = *minute* – минута

fig. = *figure* – рисунок, чертеж

в) средняя часть слова:

Ry = *railway* – железная дорога

ft = *foot* – фут

г) отдельные элементы слова, главным образом, гласные буквы:

opnl = *operational* – эксплуатационный

hb = *haemoglobin* – гемоглобин

Три последние типа сокращений читаются как полнобуквенные слова. Усеченные слова могут образовывать словосочетания:

Sp. gr. = *specific gravity* – удельный вес

at. wt. = *atomic weight* – атомный вес

Список сокращений в алфавитном порядке обычно приводится в конце любого словаря в особом разделе.

При переводе сокращений нужно учитывать, что в русском научно-техническом стиле сокращенные слова употребляются значительно реже и поэтому многие английские сокращения необходимо развертывать в полнобуквенные слова.