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ИНОСТРАННЫЙ ЯЗЫК
АНГЛИЙСКИЙ ЯЗЫК

PULP AND PAPER

Часть I

3-е издание, исправленное

Учебно-методическое пособие
по чтению научно-технической литературы

Санкт-Петербург
2024

Министерство науки и высшего образования Российской Федерации
ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ БЮДЖЕТНОЕ ОБРАЗОВАТЕЛЬНОЕ УЧРЕЖДЕНИЕ ВЫСШЕГО ОБРАЗОВАНИЯ
«Санкт-Петербургский государственный университет промышленных технологий и дизайна»
Высшая школа технологии и энергетики

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И 683

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Учебно-методическое пособие соответствует программам и учебным планам дисциплины «Иностранный язык. Английский язык» для студентов, обучающихся по направлению подготовки 15.03.02 «Технологические машины и оборудование».

Пособие состоит из двух частей. Первая часть содержит 24 урока, каждый из которых включает упражнения, тексты и вопросы к ним. Вторая часть данного пособия содержит коррективный фонетико-орфоэпический курс, таблицы основных грамматических трудностей перевода, дополнительные тексты для домашнего чтения и словарь.

Пособие предназначено для бакалавров очной формы обучения.

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ВВЕДЕНИЕ

Предлагаемое учебно-методическое пособие предназначено для студентов факультета Механики автоматизированных производств с целью развития навыков чтения и перевода специальной научно-технической литературы. Тексты посвящены общему описанию основных процессов и машин, используемых в целлюлозно-бумажном производстве.

Пособие состоит из двух частей. Первая часть содержит 24 урока. Каждый урок включает два текста: для устного изучения и письменного перевода. Предшествующие текстам упражнения необходимы для решения фонетических, лексических и грамматических трудностей и определения словарного минимума, который студенты должны заучить. Послетекстовые упражнения предназначены для активизации лексико-грамматических знаний студентов по определенной теме и повторения лексического минимума. Тексты для письменного перевода служат углублению навыков изучающего чтения по специальности.

Вторая часть данного пособия содержит:

1) Коррективный фонетико-орфоэпический курс на материале специальной лексики.
2) Таблицы основных грамматических трудностей перевода технической литературы.
3) Дополнительные тексты для домашнего чтения и переводов.

Словарь, прилагаемый в конце пособия, включает необходимые для перевода слова в их контекстуальном значении.

Все методические материалы «Приложений» используются по усмотрению преподавателя. В качестве дополнительного учебного материала рекомендуется пособие Кирилловой В. В., Вихман Т. М. Английский язык: учебно-методическое пособие по переводу научно-технической литературы для студентов и аспирантов технических специальностей». – СПб., 2004.

УРОК 1

1. Вспомните основные правила чтения согласных букв в английском языке (часть II, приложение 1,). Прочитайте следующие слова и объясните их чтение.

Original, log, papermaking, cell, carry, which, with, relationship, structure, efficient, substantially, pressure, measure, inclusion.

2. Выпишите из словаря транскрипцию и перевод следующих слов. Запомните их произношение и значение.

Beat (v), fiber (n), spread (v), establish (v), remain (v), separate (v), vat (n) dip (v), sheet (n), screen (v), place (v), surface (n), dry (v), increase (v), manufacture (v), become (v), consumption (n), relationship (n), develop (v), start up (v).

3. Правильно прочитайте интернациональные слова и дайте их русский эквивалент.

Industry ['ındəstrı], industrial [ın'dʌstrıəl], technique [tek'ni:k], period ['pı(ə)rıəd], civilization ['sıv(ə)laı'zeıʃ(ə)n], integral ['ıntıgrəl], nation ['neıʃ(ə)n].

4. От данных глаголов с помощью суффиксов *-tion (-ation, - ion, -sion)* образуйте существительные со значением названия действия и его результатов. Переведите их.

To separate, to produce, to invent, to communicate.

5. Переведите существительные, образованные с помощью суффикса -ing и означающие название действия или его результат.

Manufacturing, packaging, recycling, pulping, bleaching, grinding, refining, washing, cleaning, brightening.

6. Прочитайте и переведите словосочетания.

Papermaking machine, paper manufacturing, communication medium, bamboo mold, per capita consumption.

7. Переведите предложения, учитывая разное значение *both – (pron.) – оба; both … and (adv.) – как … так и…*

1) The drum barker is a large cylinder open at both ends.
2) A little air is drawn through the felt on both intake and exit sides of the nip.
3) These rolls both keep the wire level and remove water.

4) Some discs refiners are designed with both discs driven in opposite directions.
5) Both the bill blade design and the twin-blade design are capable of applying lightweight coatings at high speeds.

8. Переведите предложения, учитывая разное значение *either – (pron.) – любой; either … or (adv.) – или … или.*

1) Either of these designs is equipped with exhaust fans to blow the hot moist air out the top.
2) The Kraft process is called also sulphite pulp process. Either name is proper. Both refer to the same pulping operation.
3) If we want to increase the flow rate from the headbox we can either increase the head in the box or make the slice smaller.
4) The steel rolls press the web either through their own weight or the use of special cylinders.
5) Either theory will suffice to explain the fiber shortening that occurs with low – consistency refining.
6) If the web with a high moisture content is pressed either too quickly or with too much pressure, the flow rate increases.

9. Переведите предложения, обращая внимание на разные функции глагола *"to be"* (часть II, приложение 2, табл. 4,).

1) The wire is a continuous belt of woven plastic materials.
2) Drums are generally 12 – 15 ft in diameter and a barker is usually made up of sections perhaps 15 ft long.
3) Such market forces are creating new demands.
4) If soluble adhesives are to be used there must be equipment for their preparation.
5) The initial phase of any drying operation is to raise the material to the evaporation temperature.
6) This drum barker is most suited to the barking of logs that are large in diameter or very long.
7) The aim of the pulping is to liberate the fibers from the raw material used by the process.

10. Переведите предложения, учитывая особенности перевода пассивного залога (часть II, приложение 2, табл. 9).

1) A typical pulp and paper mill is operated some 355 days per year, 24 hours per day, by a staff of a few hundred people.
2) The pad of fibers is raised up out of the tank by the rotation of the drum and washed further by showers located above the drum.
3) The steam is blown into the chip stream while the chips are being loaded into the drum.

4) Each refiner is powered by a synchronous motor.
5) If the large particles are given enough opportunity to pass through the screen, they will.
6) The decision is influenced by the drying capacity of the machine.
7) Unbleached ground wood and sulphite have been and are being used in newsprint.
8) The composition of the coating is affected by the grades being produced and the method of application.
9) Modern abrasive stones are covered with blocks of synthetically produced abrasive materials.
10) The visitors were shown around the world's most advanced production line.
11) Some papers are given either chemical treatment or coating.

11. Прочитайте и переведите текст.

History and development of the paper industry

The paper industry dates from the beginning of the Christian era. It was Tsai Lun, a Chinese minister of agriculture, who invented the first paper in 105 A.D. He beat silk and mulberry bark together and screened the fibers from water with a bamboo mold. This technique was refined by the Chinese and kept as a secret until the 8th century, when it eventually spread to the Arabs and was used in Samarkand.

The art of papermaking then spread through Central Asia, Asia Minor and Egypt into Europe, where it was established by 1400. During this period the basic techniques remained unchanged. Fibers from many different sources were separated and suspended in a vat of water. A screen was dipped into the water, lifted out, separating the fibers from the water. After the sheet of paper was formed, it was pressed between felts and either hung or placed on a smooth surface to dry.

Many developments increased the production rate of papermaking, but the most important was the invention of papermaking machines around 1800. From that time to the present, the same techniques have been refined, polished and made more efficient, but not substantially changed from Tsai Lun's original concepts.

The development of the paper manufacturing is closely parallel to the development of Western civilization. Paper became an integral part of the development of our culture, both as a communication medium and in packaging. Per capita consumption of the paper reflects the relationship between paper use and industrial development of the nations.

In the USA it is 600 lb/gr, in the United Kingdom – 269 lb/gr, in France – 256 lb/gr, in Latin America – 65 lb/gr, in India – 4 lb/gr.

12. Ответьте на вопросы.

1) When was the first paper invented?
2) How did Tsai Lun prepare the first paper?
3) How did the Chinese paper spread?

4) What was the concept of the first paper manufacturing?
5) When was the first papermaking machine invented?
6) What does per capita consumption of the paper reflect?

13. Заполните пропуски нужным глаголом. Поставьте его в пассивной форме *(to form, to change, to establish, to press, to separate, to suspend, to refine).*

1) The art of papermaking … in Europe by the beginning of the XV^{e} century.
2) The fibers … and … in a vat of water.
3) The sheet of paper … and … between the felts.
4) After the invention of papermaking machines the method of paper manufacturing … but not substantially…

14. Найдите в тексте глаголы, от которых образованы существительные. Переведите их.

Refining (n), separation (n), production (n), development (n), press (n), manufacturing (n).

15. Переведите текст письменно со словарем.

The new high speed liner board machine № 4 (China) started up on September 22, 2002, only 12 months after the contract coming into force. A start-up curve is influenced by a lot of factors, some of the most important are surely a good cooperation between the project team and highly motivated people working together to reach the same goal.

The machine started up with corrugating medium of 127 g/m^2 at an impressive operating speed of 936 m/min. The first paper was already sold and successfully converted. The production curve of the first two months leaves no doubt that the capabilities of this high-tech paper machine are far beyond the expected and designed parameters.

УРОК 2

1. Вспомните основные правила чтения гласных букв в английском языке (часть II, приложение 1). Прочитайте следующие слова и объясните их чтение.

Tank, evaporate, paper, bark, area, felt, species, thermal, material, dip, fiber, dirt, acquire, top, removal, component, other, force, pulp, result, refuse, dilution, surface, durable.

2. Выпишите из словаря следующие слова с транскрипцией и переводом. Запомните их произношение и значение.

Wood (n), pulp (n), mill (n), resource (n), integrated mill (n), produce (v), recycle (v), exist (v), sell (v), buy (v), waste (n), constitute (v), raw material (n), wall (n), shape (v), cross-section (n), vary (v), property (n).

3. Правильно прочитайте интернациональные слова и дайте их русский эквивалент. Выпишите с переводом подчеркнутые слова. Посмотрите их значение в словаре.

Product ['prɔdʌkt], production [prə'dʌkʃ(ə)n], manufacture ['mænju'fæktʃə], ingredient [ɪn'gri:dɪənt], cigar [si'gɔ:].

4. От данных глаголов с помощью суффикса *-ment* образуйте существительные со значением названия действия и его результата. Переведите их.

To develop, to treat, to arrange, to move, to equip, to manage, to require, to adjust, to replace.

5. Переведите слова с префиксом *“re-“*, имеющим значение повторного действия.

Recycle, reuse, refill, remove, recleaning, rewinder, renewable, to reprocess, recirculation, to recondition.

6. Прочитайте и переведите словосочетания.

Paper product, pulp and paper mill, paper waste, wall structure, wood cell, fiber length, key property, web travel, safety reason, dust extraction system, required cylinder shape and surface.

7. Переведите предложения, учитывая значения слов *some – (pron.) – некоторый, несколько; the same – (adj.) – тот же самый*.

1) Some high-priced special grades of paper may be triple coated on both sides.

2) The same principle of screening is used in most closed screens in today's mills.
3) Some paper machines have more than one stack of calendars.
4) The greatest advantage of this type of former is that different plies of paper board do not need to be made from the same stock.
5) The knife enters the log cutting and splitting it at the same time.
6) From 1800 to the present, the same technologies of paper manufacturing have been improved, but not substantially changed from the original concept.

8. Переведите предложения, учитывая разные функции глагола *"to have"* (часть II, приложение 2, табл. 5).

1) Every machine has at least two winder reels.
2) White water is a filtrate which has drained through the forming section.
3) The diameter of the wood has to be kept above a certain minimum.
4) Refiners have rotation discs which fibrillate the fiber, thereby giving it better bounding strength.
5) It has become more difficult and expensive to manufacture press rolls of granite and substitutes have had to be found.
6) As much as 90 % of the pollutants have to be removed from the waste water of the paper making process before discharging.
7) The solid rolls have to be very smooth surfaced to smooth the surface of the paper.
8) Raw nontreated waste water from a mill normally far exceeds permitted level of pollution, that's why up to 90 % of the pollutants have to be removed before discharging.

9. Переведите предложения, учитывая особенности перевода пассивного залога.

1) Sulphite pulping operations have additional tanks which are used to accumulate sulphur dioxide gas as it is released from the digester.
2) These digesters are operated with one chips supply and one liquor supply system.
3) Logs with bark on their surfaces are loaded into the higher end of the drum barker.
4) The rolls are driven by the wire passing over them.
5) The basis weight of the web is affected by the size of the slice opening.
6) The properties of the paper are greatly influenced by refining.
7) The strength of the paper is normally positively affected by increased refining.

10. Прочитайте и переведите текст.

Paper products are manufactured primarily from wood in pulp and paper mills which are large industrial complexes. Wood from trees is a renewable natural resource. In North America alone, there are nearly 1000 pulp and paper mills which

use forests extending from northen Canada, northen Mexico and from Newfoundland in the east, to Alaska in the west. Some mills produce and sell pulp as a product. Others are integrated mills that produce pulp and then paper. Some paper mills buy pulp as a raw material, and make paper. Recycling mills take paper waste and make paper. The pulp and paper industry exists in many parts of the world.

The prime ingredient of wood which makes it useful as a raw material, is cellulose which constitutes much of the wall structure of the wood cell, or fiber.

The wood cell, or fiber, is “cigar” shaped, it is square in cross-section and varies in length. The center of the cell is hollow. Fiber length is a key property for paper making and is primarily determined by the wood species, which divide into two main types: softwoods and hardwoods. Softwoods are mainly coniferous trees. These species have long fibers, typically 3 mm long and about 3 mm wide. Hardwoods are primarily the deciduous trees. Their fibers are short, typically 0,5 mm.

11. Ответьте на вопросы.

1) What is the primary raw material of paper?
2) What kind of mills are employed in paper manufacturing?
3) What ingredient of wood is used for manufacturing of paper?
4) What is the difference between softwood and hardwood?

12. Замените пропуски нужным глаголом. Поставьте его в пассивной форме *(to determine, to affect, to made, to manufacture).*

1) Paper … out of waste paper by the recycling mills.
2) Paper products … from wood in pulp and paper mills.
3) Fiber length … by the wood species.
4) The quantity of pulp and paper mills in North America … by the rich forests of this continent.

13. Замените пропуски нужным по смыслу предлогом: *from, to, in, of, for, into.*

1) The wood is divided … two main types.
2) The cellulose constitutes the wall structure … the wood cell.
3) Fiber length is a key property … paper making.
4) The forests extend … Newfoundland … Alaska … the west.

14. Переведите текст письменно со словарем.

Prior to the application of the new coating system and depending on the condition of the roll and dryer, it might be necessary to re-condition the surface of the component by grinding. Rolls and dryer cylinders which have been doctored to remove deposits, are often grooved or damaged.

The Cylinder Service Group operates various types of grinders to re-condition drying cylinders in the machine. For safety reason, all grinding machines are remotely controlled, incorporate dust extraction system and will restore the required cylinder shape and surface fast and efficiently.

УРОК 3

1. Вспомните основные правила чтения сочетаний гласных букв в английском языке (часть II, приложение 1). Прочитайте следующие слова и объясните их чтение.

Remain, pair, call, draw, bleach, spread, appear, screen, sewer, load, moisture, cooking, hour, allow, enough, suit.

2. Выпишите из словаря следующие слова с транскрипцией и переводом. Запомните их произношение и значение.

Consist (v), layer (n), bundle (n), contain (v), bond (v), glue (n), remove (v), pulping (n), involve (v), include (v), means (n), mean (v), yield (n), due to (prep), damage (n), loss (n), strength (n), dissolve (v), brightness (n), compound (n).

3. Правильно прочитайте интернациональные слова и дайте их русский эквивалент. Выпишите с переводом подчеркнутые слова. Посмотрите их значение в словаре.

Crystalline ['krıstəlaın], molecule ['mɒlıkju:l], mechanical [mı'kænık(ə)l], chemical ['kemık(ə)l], fraction ['frækʃ(ə)n], organic [ɔ:'gænık].

4. Переведите прилагательные, обращая внимание на их суффиксы *-all, -ry, -ive, -ous, -ent, -ar, -al, -en, -ic.*

Mechanical, coniferous, deciduous, cellulosic, synchronous, efficient, woven, permanent, sensitive, conventional, abrasive, popular, primary, stationary, circular.

5. Переведите глаголы, обращая внимание на их суффиксы *-ate, -ize, -ain, -fy.*

To integrate, to causticize, to maintain, to contain, to facilitate, to fortify.

6. Прочитайте и переведите словосочетания.

Fiber structure, cylinder surface, lignin fraction, solid wood structure, chemical pulp mill, great fiber damage, single dryer can, low coat weight.

7. Переведите предложения, учитывая значения слова *means (n) – средство; by means of – посредством; mean (v) – значить.*

1) Designs of a single dryer can and means for heating it are different.
2) Bad formation means that the fibers are poorly distributed and the sheet is cloudy.

3) The web is pressed against the coater by means of backing roll.
4) It is desirable to have some means of removing condensate created during the presteaming phase from the digesters.
5) Size press coatings are limited to low coat weights, since increasing the coat weight means increasing the possibility of disruption of the surface.
6) The most common means for controlling the air in the dryer section is with dryer hood.

8. Переведите предложения, учитывая разные функции глагола *"to do"* (часть II, приложение 2, табл. 6).

1) Drum barkers do a good job of removing bark from large amount of wood.
2) High consistency does not allow much length reduction, but does favor brushing and fibrillation of the fibers.
3) In general all disc refiners favor fibrillation and do not create much cutting.
4) As the consistency of the web increases, so does the vacuum until air is drawn through the web.
5) If the rolls do bend, the web is subjected to more pressure at the edges than at the center.
6) Different types of softwood pulp do require various refinings to develop the same level of strength.

9. Переведите предложения, учитывая особенности перевода пассивного залога.

1) External liquor heating is accomplished by an arrangement of screen plates in the digester wall to allow the removal of liquor without loss of any of the chips.
2) Modern abrasive stones are given a special surface treatment to help control the removal of the fibers and their quality.
3) If the pulping operation is followed by bleaching, the resultant pulp is brighter and purer than Kraft pulp.
4) Bonding problems are seen as delamination of the paperboard during use and are referred to as ply bonding problems.
5) The actual amount of stock needed from the stock preparation area was arrived at by trial and errors and has been done on machines for years.
6) An increase in fibrillation will lead to increased bonding in the sheet. An increased bonding will increase folding and tensile strength because those are influenced by bonding.

10. Прочитайте и переведите текст.

The fiber structure consists of many layers of cellulosic "fibrils", crystalline bundles of cellulose molecules. Wood also contains hemicellulose. The third wood ingredient is lignin which bonds together the cell structure and acts like a glue.

The process of removing fibers from solid wood is called “pulping”. There are two processes for pulping: mechanical and chemical. Mechanical pulping involves “ripping” the fiber out of the solid wood structure by mechanical and thermal means. Mechanical pulp fibers include all of the above ingredients, hence the pulping process has a very high yield (90 %). However, due to the nature of the pulping process, there is a great fiber damage with a resulting loss in strength.

Chemical pulping dissolves chemically the lignin fraction (and usually the hemicellulose fraction as well). This liberates cellulose with relatively little damage and results in high strength and the possibility for high brightness after removing of all traces of lignin and bleaching of the pulp. The yield of chemical pulp is low, 50 % to 60 %, because the lignin and hemicellulose have been dissolved. Typically, these organic compounds are used as a fuel in a chemical pulp mill.

11. Ответьте на вопросы.

1) What are the main ingredients of the wood?
2) What is “pulping”?
3) What processes are used for pulping?
4) What are the advantages and the disadvantages of the mechanical pulping?
5) What is the advantage of the chemical pulping?

12. Замените пропуски нужным глаголом. Поставьте его в пассивной форме *(to follow, to use, to influence, to dissolve).*

1) The strength of the fiber … by the nature of pulping process.
2) The high strength of the fibers … by the possibility for high brightness after removing lignin and bleaching of the pulp.
3) During the chemical pulping the lignin and hemicellulose …
4) The organic compounds … as a fuel in a chemical pulp mill.

13. Найдите в тексте слова того же корня, что и следующие:

Strong (a), bright (a), solution (n), possible (a), bleach (v).

14. Переведите текст письменно со словарем.

About 5,5 tons of water are removed in the press section. This water may be collected and reused, or it may contain chemicals or other contaminants that prevent its reuse. The water lost in the dryers is about 2 tons of water per ton of paper.

The pulp and paper industry is highly energy intensive. It accounts for about 3 % of total U.S. energy consumption. This industry is unique in that a significant portion of the total energy required is self-generated from fuels such as spend pulping liquors and woodwaste. As a result, pulp and paper manufacturers significantly reduced the amount of purchased energy.

УРОК 4

1. Вспомните основные правила ударения в английском языке (часть II, приложение 1). Прочитайте следующие слова и объясните ударение в них.

Separate, compound, industrial, evaporate, constitute, precipitate, pressure, pressurized, machine.

2. Выпишите из словаря следующие слова с транскрипцией и переводом. Запомните их произношение и значение.

Require (v), printing surface (n), curl (v), bleach (v) bend (v), depend (v), division (n), achieve (v), grind (v), grinder (n), refine (v), groundwood mill (n), log (n), raise (v), rip (v) feed (v), pocket (n), chip (n) gap (n), pressurized (a), chip refiner (n), disintegrate (v).

3. Правильно прочитайте интернациональные слова и дайте их русский эквивалент. Выпишите с переводом подчеркнутые слова. Посмотрите их значение в словаре.

Unique [ju:'ni:k], design [dɪ'zaɪn], photocopier ['fəutə'kɔpɪə], abrasive [ə'breɪsɪv], synchronous ['sɪŋkrənəs], thermo ['θɜ:mə(u)], control [kənˈtrəʊl].

4. С помощью суффикса *-er (-or)* образуйте от данных глаголов существительные со значением деятеля. Переведите их.

To invent, to grind, to refine, to form, to bark, to chip, to pulp, to strain – процеживать, to thicken, to show.

5. От данных прилагательных с помощью суффикса *-ity (-ty)* образуйте существительные со значением названия качества. Переведите их.

Proper – собственный, dense, uniform, possible, various, productive, similar – подобный, rapid – быстрый.

6. Прочитайте и переведите словосочетания.

Hardwood pulp, wood chips, water vapour, coat weight, cylinder machine, machine speed and efficiency, air inlet port, groundwood mill, optimally consistent paper quality, actual installation work, latest analysis equipment, preliminary project phase, stock preparation area.

7. Переведите предложения, учитывая значения слов *because – (cj) – потому что; because of (prep.) – из-за*.

1) The water from couch pit is returned to the stock preparation area for reuse because it contains fibers.
2) Because of large number of dryer cans the arrangement of the web is sometimes vertical.

3) Because of potential pollution and recovery problems sulphate pulp is less utilized than kraft pulp.
4) There is a maximum desirable diameter because increasing the diameter moves the rolls apart and creates a span between them.
5) Because of the high temperature of the water in the forming section, the drainage rates and the removal of water in the press are increased.
6) Because of their smooth texture, left pieces were used to produce handmade paper.

8. Переведите причастные формы следующих глаголов (часть II, приложение 2, табл. 14).

To require – requiring – required – having required.
To bleach – bleaching – bleached – having bleached.
To bend – bending – bent – having bent.
To depend – depending – depended.
To refine – refining – refined – having refined.
To achieve – achieving – achieved – having achieved.
To consist – consisting.
To adjust – adjusting – adjusted – having adjusted.

9. Переведите предложения, учитывая особенности перевода причастий.

1) The stock arrives at the conveyor belt consisting of synthetic woven material.
2) Sulphur dioxide, when dissolved in water, forms a weak acid which reacts with the lignin.
3) These dimensions of the chip are less easily controlled being dependent on different parameters.
4) The drum is rotated, causing the logs to tumble over one another creating a rubbing action that strips the bark from the log.
5) The consistency of the stock being refined is very important when determining the relative amount of cutting.
6) Sodium hydroxide can cause discoloration of the fibers, necessitating to restore the color of the fiber.
7) Having installed fully controlled conditions of sheet formation and drainage in the press section, the mill obtained uniform product quality.

10. Прочитайте и переведите текст.

Pulp and paper products are of different types. Each of these products requires certain unique properties which must derive from the raw material. For instance, photocopier paper must have excellent brightness, a good printing surface and must not curl in the photocopier. Highly bleached chemical pulp is used. This type of paper is made by blending hardwood pulp (for a very smooth printing surface) with softwood pulp (for strength).

Pulp and paper mills vary greatly in design because their design depends on the product being made. The simplest division is to separate pulping from papermaking.

Mechanical pulping can be achieved by grinding or refining. Groundwood mills mechanically grind whole logs against an abrasive surface. The pulping action is a combination of raising the temperature, and mechanically ripping the fiber from the wood surface. This is done by feeding logs to the "pocket" of the grinders which are powered by large synchronous motors (typically 5,000 to 10,000 HP). A typical groundwood mill may have 10 to 20 grinders. The thermo-mechanical pulping process is the more modern way of mechanical pulping. It consists of feeding wood chips into the gap of rotating pressurized machines, called chip refiners, to produce pulp directly. Normally, there are two refining stages. The chips disintegrate inside the refiner as they pass between the teeth of the refiner plates. Each refiner is powered by a synchronous motor of 10,000 to 30,000 HP. The amount of refining can be controlled by adjusting the gap between rotating plates. Mechanical pulps can be brightened (bleached) to some degree.

11. Ответьте на вопросы.

1) What does pulp and paper mill design depend on?
2) How is mechanical pulping achieved?
3) What does mechanical pulping action consist of?
4) What machine is used for grinding wood?
5) What machines does the thermo-mechanical pulping use?
6) How are the chips disintegrated in the refiners?
7) How is refining process controlled?

12. Замените пропуски нужным глаголом. Поставьте его в активной или пассивной форме *(to power, to use, to affect, to blend).*

1) Paper properties … by the raw material properties.
2) Highly bleached chemical pulp … softwood pulp for making photocopier paper.
3) Hardwood pulp …. with softwood pulp for making photocopier paper.
4) The grinders … by synchronous motors.

13. Переведите текст письменно со словарем.

The firm investigated in full detail all interrelationships between the machine concept, raw material and fabrics. It was necessary to ensure optimal cleaning, optimal service life and optimally consistent paper quality before the actual installation work.

The quality of the paper produced on the paper machine 4 was repeatedly checked using the latest analysis equipment. Towards the end of the preliminary project phase, paper samples were sent for printing and afterwards analyzed in the laboratory for printability. This project ensured full satisfaction not only for the manufacturer, but also for his customers – the print shops. Thanks to these efforts, the paper machine 4 was started up four weeks earlier than planned and produced saleable paper right from the beginning.

УРОК 5

1. Выпишите из словаря следующие слова с транскрипцией и переводом. Запомните их произношение и значение.

Divide (v), acid (n), cook (v), cooking process (n) alkali (n), digester (n), start (v), impregnate (v), cooking liquor (n), extract (v), blow – blew – blown (v), continuous (a), batch digester (n), blow-tank (n), wash (v), washer (n), brown stock washer (n), counter current (n), spend – spent – spent (v), stream (n), output (n).

2. Правильно прочитайте интернациональные слова и дайте их русский эквивалент. Выпишите с переводом подчеркнутые слова. Посмотрите их значение в словаре.

Sulphite ['sʌlfaɪt], to extract [ɪks'trækt], column ['kɔləm], pump [pʌmp], multi-stage ['mʌltisteɪʤ], hemi-cellulose ['hemi'seljuləus].

3. С помощь суффикса *-ly* образуйте от данных прилагательных наречия. Переведите их.

Eventual, substantial, primary, relative, partial, successful, simultaneous, alternative, tight, immediate, manual.

4. Переведите следующие слова учитывая отрицательное значение префиксов *un-, um-, in-, de-, dis-, counter-*.

Unchanged, to discharge, uncooked, dewatering, improperly, uncoated, unbleached, dissolve, unevenly, unsupported, deformation, counterion, counterflow, countercurrent.

5. Прочитайте и переведите словосочетания.

Blow tank, extraction process, digester house, pulp stream, brown stock washer, multi-stage countercurrent washer, spent sodium compound, kraft liquor cycle, press-to-drying transfer.

6. Переведите предложения, учитывая значения слов *with (prep) – с; which (pron) – который.*

1) Each of paper products requires certain unique properties which must derive from the raw material.
2) The chips are integrated with white cooking liquor.
3) The forming boards can be simply a series of boards with slots between them.

4) Table rolls are small diameter rolls supported on each end with bearings which allow them to rotate.
5) The slice is a narrow opening in the head box through which the stock flows.
6) The final moisture content of the paper is about 5 % – the average moisture content at which paper is in equilibrium with atmosphere.
7) One of the limiting factors in the rate of evaporization is the speed with which the water vapour can be removed from the water-air interaction.

7. Переведите причастные формы следующих глаголов.

To divide – dividing – divided – having divided.
To recycle – recycling – recycled.
To feed – feeding – fed – having fed.
To lead – leading – led – having led.
To spend – spending – spent – having spent.
To descend – descending – having descended.
To blow – blowing – blown.
To remove – removing – removed – having removed.
To return – returning – having returned.

8. Переведите словосочетания, учитывая перевод причастия в функции определения и как часть глагольного времени.

1) The chemicals are recycled …
   The chemicals recycled by the liquor …
2) The chips are impregnated with the liquor …
   The chips impregnated with the liquor …
3) The lignin is dissolved …
   The lignin dissolved by the cooking liquor …
4) The pulp is pumped to the washers …
   The pulp pumped to the washers …
5) The compounds are reused …
   The compounds reused …

9. Переведите предложения, учитывая особенности перевода причастий.

1) The washed stock can be removed from the drum surface, mixed with water and pumped on the next operation.
2) Paper made on the twin-wire machines may have better printing properties.
3) This paper was made on twin-wire machine.
4) The felt and web picked up from the first cylinder proceed to the second cylinder.
5) An average of 30 million BTU’s are required to manufacture a ton of pulp and paper.

6) A significant portion of the total energy required is self-generated from fuels such as spent pulping liquor and wood waste.
7) The knots, chips and uncooked pieces of wood removed from the stock are used as fuel in the waste liquor furnace.
8) The recovery boiler produces steam consumed by the mill.

10. Прочитайте и переведите текст.

Chemical pulping can be divided into two main processes: sulphite and Kraft. The sulphite process is an acid based cooking process whose use is in decline. The Kraft process is an alkali based process in which the active chemicals are fully recycled in the Kraft liquor cycle. The Kraft process itself consists of many operations. It starts when chips are fed to a digester, are impregnated with white cooking liquor and cooked at about 170 ºC for about an hour. In this process the lignin and hemicellulose are dissolved. The spent cooking liquor is then extracted and the pulp is blown into the blow tank. Modern digesters are continuous vertical columns, the chips descending down the column. The impregnation, cooking and extraction processes take about three hours or so. Some mills use batch digesters (there may be 6 to 20 batch digesters in the digester house).

From the blow tank the pulp is pumped to the brown stock washers in which the pulp is washed in a multi-stage countercurrent washing process to remove the spent cooking liquor, including the dissolved organic compounds (lignin, hemicellulose) and the spent sodium compounds which must be removed from the pulp steam and reused. The two output streams consist of washed pulp (which goes to the bleach plant for bleaching or to the paper machine if bleaching is not required) and the spent liquor which is called black liquor and is returned to the Kraft liquor cycle.

11. Ответьте на вопросы.

1) What are the main chemical processes?
2) What are the sulphite and Kraft processes based on?
3) How are the chips treated in the digester?
4) How many digesters are there in a digester house?
5) What do the modern digesters represent?
6) How is the pulp treated after leaving the digesters?
7) What is the aim of th washing?
8) Where does the pulp go after the washing?
9) Where does the spent liquor return?

12. Замените пропуски нужным глаголом. Поставьте его в активной или в пассивной форме *(to use, to dissolve, to take, to be).*

1) The lignin and the hemicellulose … during the cooking process.
2) The digesters … continuous vertical colomns.

3) Batch digesters … at some mills.
4) The impregnation, cooking and extraction processes … about 3 hours.

13. Образуйте с помощью данных суффиксов существительные от указанных глаголов. Переведите их.

-tion
to impregnate, to extract, to digest, to operate
-ing
to cook, to wash, to blow, to pump, to remove, to bleach, to recycle.

14. Переведите текст письменно со словарем.

The press was started up with double layer felts. These felts have excellent start-up behaviour, with stable drainage characteristics over their entire service life. Their good conditioning behaviour and constant permeability have ensured a consistent moisture cross-profile.

The first 4 dryer groups were started up with the new fabrics. These high-speed fabrics showed outstanding web control, press-to-drying transfer and easy cleaning. Their abrasive resistance and running stability were continuously improved, so that operation today is characterized by exceptionally long service life and outstanding reliability. One can totally rely on these dryer fabrics and related service.

УРОК 6

1. Выпишите из словаря следующие слова с транскрипцией и переводом. Запомните их произношение и значение.

Washer (n), multiple-effect evaporator (n), solid (a), evaporation (n), steam (n), recovery boiler (n) fire (v), fuel (n), smolder (v), bottom (n), char-bed (n), burn (v), smelt (n), pour (v), tank (n), conventional (a), burned lime (n), send (v), lime kiln (n).

2. Правильно прочитайте интернациональные слова и дайте их русский эквивалент. Выпишите с переводом подчеркнутые слова. Посмотрите их значение в словаре.

Cycle ['saɪk(ə)l], to start [stɑ:t], tank [tæŋk], causticize ['kɔ:stisaiz], to result in [rɪ'zʌlt], dioxide [daɪ'ɒksaɪd].

3. Переведите прилагательные, учитывая значения суффиксов *-ful* (положительное качество) и *-less* (недостаточность).

Useful, useless, powerful, powerless, stainless, colourless, successful, helpful, harmful.

4. Переведите прилагательные, учитывая значения суффикса *-able (-ible, -uble)* – способный, подверженный, поддающийся.

Acceptable, adjustable, notable, valuable, suitable, unusable, obtainable, noticeable, reliable.

5. Прочитайте и переведите словосочетания.

Recovery boiler, char-bed, kraft liquor cycle, black liquor solids, carbon dioxide gas, dry vat conversion, suction-zone bottom wire, two-wire former.

6. Переведите предложения, учитывая значения слов *order (n) – приказ, заказ, порядок; in order to – для того, чтобы*.

1) The order was given to produce the highest product quality.
2) It was reported that there were about 90 two-wire formers operating world – wide at the end of the year and another 50 were in order.
3) A curved surface is placed under the wire in order to create a reduced pressure as the stock passes over it.
4) In order to warm the web and prevent localized overheating of the web, the temperature of the first dryer is usually around 65 ºC.

5) This coater uses a narrow wedge of high-velocity air in order to meter and smooth the surface of the paper web.
6) The wire returns to the breast roll in order to receive more stock and continue formation of the continuous web.
7) The rod is rotated in the opposite direction of the web in order to reduce wear and remove foreign particles that could cause streaks.

7. Переведите причастные формы следующих глаголов.

To raise – raising.
To contain – containing.
To evaporate – evaporating – evaporated – having evaporated.
To concentrate – concentrating –concentrated – having concentrated.
To consume – consuming – consumed – having consumed.
To react – reacting.
To send – sending – sent – having sent.

8. Переведите предложения, учитывая особенности перевода независимого причастного оборота (часть II, приложение 2, табл. 15).

1) The temperature increasing, the rate of evaporation increases.
2) Modern digesters are continuous vertical columns, with chips descending down the column.
3) The coating operation may be performed on the paper machine, with the coater being an integral part of the machine.
4) The web of paper can only be raised to about 40 % consistency by pressing, the rest of the water in the sheet being removed by evaporation.
5) The vertical pipe of the dryer can is designed such that condensate will be siphoned out by only one of its two arms, the other being used to brace or fix the siphon in position.

9. Прочитайте и переведите текст.

The Kraft liquor cycle starts with pumping black liquor from the brown stock washers to the multiple effect evaporators where the black liquor solids are raised from about 15 % to about 50 % by evaporation with steam. These solids are then fed to the recovery boiler in which the black liquor solids are further concentrated and then the liquor is fired into the recovery boiler as a fuel. The bottom of this boiler contains a large smoldering char-bed of burning black liquor. The smelt pours from the bottom of the recovery boiler into a dissolving tank, where it is dissolved in water, and becomes green liquor. The upper part of the recovery boiler is conventional in design and produces about 50 % of the total steam consumed by the mill. The green liquor is pumped to the causticizing area where burned lime is reacted with the green liquor in order to constitute the white cooking liquor. The calcium carbonate is precipitated and sent to the lime kiln, where the $CaCO_3$ plus heat

produce burned lime (CaO) plus carbone dioxide gas. The burned lime is used in the causticizing area to reconstitute the white cooking liquor. The resulting white liquor is sent to the digester for cooking.

10. Ответьте на вопросы.

1) What is the first stage of the Kraft process?
2) Were are the black liquor solides concentrated?
3) Where are the black liquor solides used as a fuel?
4) What is the green liquor?
5) How is the white cooking liquor produced?

11. Замените пропуски нужным глаголом. Поставьте его в активной или в пассивной форме *(to produce, to pour, to send, to reconstitute).*

1) The calcium carbonate … to the lime Kiln.
2) The $CaCO_3$ plus heat … burned lime.
3) The burned lime … the white cooking liquor.
4) The smelt … into the dissolving tank.

12. Переведите слова, учитывая значение их префиксов.

Recycle, discharge, reconstitute, recovery, dissolve, recondition

13. Замените пропуски нужным по смыслу словом *(green, white, black).*

1) The … liquor is formed in the brown stock washer.
2) The … liquor is formed in the lime kilm.
3) The … liquor is formed in the dissolving tank.

14. Переведите текст письменно со словарем.

Fibers that have been liberated are not generally ready to be used to make paper. The notable exceptions are: groundwood pulp, which is used in newsprint, and waste paper, used in combination boxboard for package such as cereal boxes. Groundwood fibers are mechanically treated by the grinder and secondary fibers were already refined for their original use. If at this point in their treatment chemical pulp fibers were formed into a pad on a screen, the dried pad of fibers would not bond together well and might even fall apart when attempts were made to remove it from the screen. The reasons for this behavior are that the fibers are relatively stiff and don’t have enough bonding groups on their surfaces to bond together into a strong sheet.

УРОК 7

1. Выпишите из словаря следующие слова с транскрипцией и переводом. Запомните их произношение и значение.

Need (v), sequential (a), application (n), follow (v), sequence (n), provide (v), brighten (v), bleach plant (n), flux (n), move (v), closed (a), mix (v), carry out (v), desire (v), improve (v), level (n), frequently (adv).

2. Правильно прочитайте интернациональные слова и дайте их русский эквивалент. Выпишите с переводом подчеркнутые слова. Посмотрите их значение в словаре и запомните их.

Chlorine ['klɔ:ri:n], final ['faɪn(ə)l], peroxide [pə'rɔksaɪd].

3. Переведите следующие существительные, образованные с помощью суффикса *-ness* и означающие название качества.

Brightness, smoothness, thickness, whiteness, cloudiness, hardness.

4. Переведите слова, образованные с префиксом *inter-*, означающим меж-, между-.

International, interaction, interrelated, interchangeable, intermeshing gear.

5. Прочитайте и переведите словосочетания.

Pulp mill, water suspension, bleach plant, bleach plant technology, oxygen and hydrogen peroxide, multi-stage bleach sequence, waste treatment plant, foam flotation process, low consistency stock suspension.

6. Переведите предложения, учитывая значения глагола *“follow”* – следовать, идти за.

1) The web of paper is trimmed to the width needed by the process that will follow.
2) The chips are delivered to the chip bin from the chip storage area following the necessary screening operations.
3) The pulp is normally subjected to washing immediately following bleaching to remove both the spent bleach liquor and the impurities.
4) Following the cooking and screening operations, it is necessary to remove the waste liquor from the stock.
5) Following dilution to below 1 % consistency for the headbox, the stock is sent through screeners.

7. Переведите предложения обращая внимание на независимый причастный оборот.

1) The cooking liquor charged into the digester, the pulping operation carried out, the digester is emptied and refilled for the new cycle.
2) Foam flotation process operates on low consistency stock suspension, with the ink being collected and removed from the fibers.
3) This type of pulpers may be operated continuously, with water and pulp being added to maintain the desired level of volume and defibered stock being removed constantly.
4) The two-wire machines use two forming wires, with the headbox squirting the stock between the two and the water being removed from both directions.
5) The cooking process being finished, the pulp needs to be bleached.
6) The pulp being mixed with bleaching chemicals, it may be pumped into the closed tank.

8. Прочитайте и переведите текст.

After cooking, the pulp may need to be bleached. This is necessary for all products which require high brightness or the complete removal of lignin. A typical bleach plant consists of the sequential application of specific chemicals, each followed by a reaction vessel and a washing stage. A bleaching sequence which has been used often in the past involves pumping unbleached “brown stock” from the pulp mill and applying the following chemicals in turn: chlorine (to dissolve the lignin), caustic (to wash out lignin by-products), chlorine dioxide (to brighten), caustic (to dissolve by-products) and finally chlorine dioxide to provide final brightening. Bleach plant technology is currently in a state of flux and moves toward new chemicals, chiefly oxygen and hydrogen peroxide.

The equipment used for the bleaching operations consists primarily of closed tanks into which the pulp is pumped in water suspension after being mixed with bleaching chemical. The pulp is carried by water throughout most of the bleaching operations.

The washing is carried out in rotary drum washers.

Not all pulps are bleached with multistage bleach sequence. Groundwood pulps frequently receive only one stage bleach.

If unbleached pulp is desired, the groundwood pulp will not require any further treatment. It is possible to bleach the groundwood pulp to improve the whiteness and permanence of the paper to be produced, but because of the presence of lignin in the fibers the quality can never be raised to the level of chemical pulps.

9. Ответьте на вопросы.

1) Why is bleaching necessary after cooking?
2) What chemicals are used for bleaching?
3) What stage is each chemical application followed by?

4) What chemical does the modern technology of bleaching prefer?
5) What does the equipment of bleaching consist of?
6) What kind of bleach do groundwood pulps receive?

10. Замените пропуски нужным глаголом. Поставьте его в активной или в пассивной форме *(to pump, to follow, to dissolve, to use, to provide).*

1) Each chemical application … by a washing stage.
2) Caustic … to wash out lignin and by-products.
3) Chorine … the lignin.
4) The pulp … in water suspension after being mixed with bleaching chemical.
5) Chlorine dioxide … final brightening.

11. Подберите нужный термин к данным определениям *(washers, digesters, evaporations, closed tanks, recovery boilers).*

1) The washing is carried out in rotary drum called …
2) The pulp is bleached in …
3) The black liquor is evaporated in …
4) The black liquor solids are concentrated in …
5) The chips are cooked in …

12. Переведите текст письменно со словарем.

The management of the whitewater balance on the wet end of the machine is extremely important to the economic success of the mill. The material balance also shows the dependence of the industry on an adequate water supply. The location selected for a will must have water. But even with the large amount of water needed in the wet end of the machine the total consumption of the mill will be below that level, due to recirculation within the mill. The actual amount of water required will depend on how well the water is reused in the mill and what other operations are performed there, such as pulping, bleaching and coating. A mill making 100 tpd of paper would circulate about 6 million gallons per day (gpd) through the headbox requiring 2 million gpd in fresh water and sending a similar volume to the waste treatment plant.

УРОК 8

1. Выпишите из словаря следующие слова с транскрипцией и переводом. Запомните их произношение и значение.

Refine (v), various (a), additive (n), screen (v), clean (v), dirt (n), dilute (v), lean (a), slurry (n), medium (n), wire, fourdrinier (n), former (n), wet (a), moisture (n), content (n), thickness (n), store (n), ration (n), blend chest (n), white water (n), orifice (n), jet (n), belt (n).

2. Правильно прочитайте интернациональные слова и дайте их русский эквивалент. Выпишите с переводом подчеркнутые слова. Посмотрите их значение в словаре и запомните их.

Tendency ['tendənsı], specific [spı'sıfik], former ['fɔ:mə], calender ['kælındə], consistency [kən'sıst(ə)nsı], fibrillate ['fıbrıleıt], porous ['pɔ:rəs].

3. Переведите слова с приставкой *pre-*, означающей предварительное действие.

Presteam, predetermine, predominate, prevent, prescribe.

4. Переведите слова, с префиксами избыточности *over-, super-, hyper-, ultra-, extra-, multy-, poly-.*

Supercalandring, multistage, overcooked, multicylinder, overheating, extraordinary.

5. Переведите слова, с префиксами недостаточности *under-, sub-.*

Undercooked, underestimate, suboptimal.

6. Прочитайте и переведите словосочетания.

Bonding tendencies, paper making, pulp slurry, drainage medium, high density storage tank, softwood and hardwood stock, weave design.

7. Переведите предложения, обращая внимание на перевод слова *as (cj) – когда, так как, как.*

1) Oxidizing bleaches operate as reducing agents.
2) If the web is strong, as it is the case of paperboard manufacture, the pressure on the web must be stronger.
3) As the speed of the machine increases, the roll will carry more water into the nip. As the amount of water increases, the web may be blown out from the nip.

4) The paper releases steam or water vapour as it leaves the dryer on the bottom of the calendar and passes up to the top dryer.
5) The vacuum in the drum must be increased as the thickness of the pad of fibers increases.
6) The wire is delivered to the papermill as an endless belt.
7) As the consistency of the headbox increases the web begins to be deposited on the wire.

8. Переведите предложения обращая внимание на подчеркнутые глагольные формы.

1) If the grade of paper being made on the paper machine is to be changed, the mixture of stock being prepared must be changed first.
2) If the paper is coated and the ink is adhering only to the coating, the ink can simply be washed off the paper.
3) This drum has found application in operations where lumber mill and pulpmill are operating together.
4) The roll is rotating causing the stock to be rotated around the inside of the tub.
5) After the pulping operation, the spent cooking liquor is removed from the pulp and burned to recover the cooking chemicals.

9. Прочитайте и переведите текст.

Paper making

Paper is made on a paper machine. Paper making involves refining various types of pulps (mechanical work to improve bonding tendencies) individually, and then blending them together in combination with specific additives. This stock is then screened and cleaned to remove any dirt, and is diluted to a very lean pulp slurry before being ejected onto a moving drainage medium known as “the wire”, fourdrinier or former where a sheet of wet paper is formed. This wet paper is then pressed, dried, and calendered (pressed between smooth polished surfaces) to produce a smooth final product with a specific basis weight (weight per unit area), moisture content, thickness, smoothness, brightness, color, ash content and many other properties.

Hardwood and softwood stocks are stored in High Density storage tank at about 15 % consistency (mass percentage of pulp in a slurry). As the stock is pumped from the High Density tank it is diluted to 4 % and refined. Paper machine refiners have rotating discs which fibrillate the fiber, thereby giving it better bonding strength. The hardwood and softwood stocks are then blended together in a desired ratio in a blend chest, and sent to the machine chest, the final source of stock for the paper machine. From here the stock is diluted with white water (filtrate which has drained through the forming section), and is sent to the headbox (a pressurized compartment with a wide orifice which allows the stock to be ejected as a wide jet).

The stock discharges from the headbox at the required speed onto the “wire”, a wide porous “conveyor belt” consisting of synthetic woven material. Most of the fibers stays on, and most of the water drains through to be recycled again as white water.

10. Ответьте на вопросы.

1) What operations does the paper machine carry out?
2) What are the main characteristics of the final product of the paper machine?
3) How is refining carried out on the paper machine?
4) Where is blending carried out?
5) Where is pressing carried out?

11. Замените пропуски нужным глаголом. Поставьте его в активной или в пассивной форме *(to dilute, to recycle, to store, to drain, to improve).*

1) The water … through the wire.
2) The water … again as white water.
3) Refining … bonding tendencies of the pulp.
4) Hardwood and softwood … in the storage tank.
5) The stock … to 4 %.

12. Найдите термин эквивалентный данному определению *(screening and cleaning, calendering, refining, white water, wire, fourdrinier or former).*

1) Mechanical work to improve bonding tendencies of the pulp.
2) Removing dirt of the stock.
3) Moving drainage medium where a sheet of wet paper is formed.
4) Pressing between smooth polished surfaces.
5) Filtrate which has drained through the forming section.

13. Переведите текст письменно со словарем.

The fourdrinier and cylinder wires are similar and are a woven material originally made of brass wire. The brass resisted chemicals, but did not resist wear too well and has been replaced by stainless steel in some applications and plastic strands in others. Although a great many varieties of weave designs are possible and a numbers of mesh sizes are used, the wire is commonly about a 100-mesh weave. One hundred mesh means that 100 wires/in. are used in the weaving of the screen or wire. If the wire were 100 by 60, it would mean that there are 100 wires in one direction and 60 in the other. The actual size of the holes is a function of the mesh size, the diameters of the strands used and the style of weave.

УРОК 9

1. Выпишите из словаря следующие слова с транскрипцией и переводом. Запомните их произношение и значение.

Barker (n), removal (n), jet squirter (n), impinge (v), blast (v), suit (v), find (found, found) (v), handle (v), treat (v), end (n), load (v) cause (v), tumble (v), create (v), rub (v), strip (v), retain (v), fall (fell, fallen) (v), opening (n), submerge (v), ring (n), knife (n), tear (v).

2. Правильно прочитайте интернациональные слова и дайте их русский эквивалент. Выпишите с переводом подчеркнутые слова. Посмотрите их значение в словаре и запомните их.

Hydraulic [haɪ'drəlɪk], efficient [ɪ'fɪʃ(ə)nt], diameter [daɪ'æmɪtə], cylinder ['sɪlɪndə], to transport [træn'spɔ:t], utilize ['ju:tɪlaɪz].

3. Прочитайте ряды однокоренных слов. Переведите их, исходя из значения словообразовательных элементов.

Equip (v), equipment (n);
bark (n), bark (v), barking (n), barker (n);
pump (n), pump (v);
apply (v), application (n);
divide (v), division (n);
treat (v), treatment (n);
create (v), creation (n), creator (n);
open (v), opening (n);
part (n), participate (v), partially (adv);
advantage (n), disadvantage (n).

4. Прочитайте и переведите словосочетания.

Lumber mill, tree length log, drum barker, individual log mechanical barker, twin-wire machine, suction box, falling rate zone, press felt moisture content, printing ink detachment.

5. Переведите предложения, учитывая значения слов *number (n) – число, количество, номер; a number of – ряд, несколько*.

1) The number of control engineers varies from a dozen in some mills to none in others.
2) Dividing the weight of the stock by the number of reams gives us the weight per ream.

3) These drum barkers can handle a large number of logs.
4) The number of dryers needed is a direct function of the amount of water that must be evaporated.
5) The roll coter does a number of operations: it meters coating, smooths the coating and then applies it in the nip, where the web passes through.
6) Since their introduction in 1950s, blade coters have gone through a number of improvements.
7) There is a number of modifications of the coaters: air knife coater, blade coater, trailing blade coater, fountain applicator.

6. Переведите предложения, учитывая значения слова *case (n) – случай, ящик*.

1) There are many cases for packing the equipment.
2) In some cases the drum barker is partially submerged in water.
3) In case that the water is not thrown against the wire, a thin film of water is carried back up to the wire on the surface of the rolls.
4) The degree of water resistance is variable, but in any case not enough to make the paper truly waterproof.
5) The coating realized by trailing blade coaters is quite flat on the surface but may vary in thickness in case if the raw stock web is rough.

7. Переведите предложения, учитывая особенности перевода инфинитива (часть II, приложение 2, табл. 16)

1) Kraft papermills have learned to control the emissions of unpleasant smelling sulphur compounds.
2) The stock is screened and cleaned to remove any dirt.
3) The first coater to be used and still the most frequently used, is the size press.
4) To increase the potential operating speed of the machine, it is desirable to have the press felt moisture content as low as possible.
5) The size of the logs to be handled in a drum barker needs to be controlled.
6) Each sort of paper requires a slightly different treatment to be used most effectively.

8. Прочитайте и переведите текст.

Bark removal. Barkers

The equipment designed to remove bark from the logs are called barkers. They are of 2 types: hydraulic and mechanical. Hydraulic bar-

kers require the use of water to remove the bark from the tree. The water is pumped by high-pressure pumps into jet squirters which impinge on the surface of the tree or log and blast off the bark.

The hydraulic barker does a very efficient job with very little damage to the wood and is most suited to the barking of logs that are large in diameter and very

long. This type of barker has therefore found application in operations where a lumber mill and a pulp mill are operating together, or in other applications where treelength logs need to be handled.

Mechanical barkers can be divided into major categories: those that handle a large number of logs at the same time, and those that treat individual logs. The type that treats a large number of logs at a time is called a drum barker. The drum barker is a large cylinder open at both ends. Logs with bark on their surface are loaded into the higher end of the drum. The drum is rotated, causing the logs to tumble over one another creating a rubbing action that strips the bark from the logs. The initial part of the drum barker may be closed to retain water, soften the bark and remove it from the tree.

Next sections may be open to allow the bark that is removed from the logs to fall out through the openings and be transported away. In some cases the drum barker will be partially submerged in water to keep the logs moist and to carry the bark away from the barker.

The individual-log mechanical barker has different varieties. The wood is carried through a ring of knives that rotates around the log stripping bark from its surface. This barker can also remove good fibers with the bark if the wood is soft. Therefore chains are used which will tangle in the bark and tear the bark off the surface of the log. Sometimes rough-surfaced wheels are utilized that rub on the surface of the log.

In any case all mechanical barkers have two disadvantages: they remove good wood along with the bark if the wood is soft and they can not remove all the bark if the bark is too hard. For these reasons barking operations function better if the wood is wet and green.

9. Ответьте на вопросы.

1) What types of barkers are used to remove bark from the logs?
2) How do the hydraulic barkers remove the bark?
3) What is the advantage of hydraulic barkers?
4) What are the major categories of mechanical barkers?
5) What is the advantage of mechanical barkers?

10. Замените пропуски нужным глаголом. Поставьте его в активной или в пассивной форме *(to cause, to remove, to load, to strip, to submerge).*

1) Logs … into the higher end of the drum.
2) The drum … the logs to tumble over one another.
3) The rubbing … the bark from the logs.
4) The bark … from the logs in the barker.
5) The drum barker … in water.

11. Закончите предложения, употребив нужное обстоятельство цели.

- to keep logs moist and to carry the bark away
- to tear the bark of the logs
- to allow the bark to fall out through the openings
- to rub on the surface of the log
- to retain water and soften the bark

1) Chains are used …
2) Rough surfaced wheels are utilized…
3) The initial part of the barker is closed …
4) This part of the barker is open …
5) The drum barker is submerged in water …

12. Переведите текст письменно со словарем.

After the bales of recovered paper have been dewired and mixed with loose paper the mixture is stored in bays. A wheel loader loads the furnish from the storage bays onto a conveyor belt which feeds the drum. Here the recovered paper is gently broken down into individual fibers at the consistency between 25-28 %. This high stock consistency as well as good mixing of the stock by means of a displacer achieves excellent printing ink detachment.

The coarse contaminants are removed from the stock using 2-stage heavy particle separation and 2-stage screening system and then it is stored in the dump chest. The subsequent stock cleaning at the consistency of 2 % by means of some cleaners provides efficient dirt particle removal and protects the following slotted screening system. A new flotation system ensures efficient removal of the detached printing inks.

УРОК 10

1. Выпишите из словаря следующие слова с транскрипцией и переводом. Запомните их произношение и значение.

Chipper (n), reduce (v), allow (v), penetrate (v), flywheel (n), chute (n), angle (n), axe (n), split (v), extension (n), groundwood pulp (n), hold (held, held) (v), stone (n), grit (n), piston (n), fill (v), bundle (n), shive (n) sliver (n), knot (n), grinding machine (n).

2. Правильно прочитайте интернациональные слова и дайте их русский эквивалент. Выпишите с переводом подчеркнутые слова. Посмотрите их значение в словаре и запомните их.

Uniform ['ju:nɪfɔ:m], realize ['rɪəlaɪz], combination ['kɔmbɪ'neɪʃ(ə)n], synthetically [sɪn'θetɪkəlɪ], rotation [rəu'teɪʃ(ə)n].

3. Прочитайте ряды однокоренных слов. Переведите их, исходя из значения словообразовательных элементов.

Chip (v), chip (n), chipping (n), chipper (n);
grind (v), grinding (n), grinder (n), grinding machine (n);
cook (v), cooking (n) cooking operation (n), cooker (n);
screen (v), screen (n), screening (n), screener (n);
remove (v), removal (n).

4. Прочитайте и переведите словосочетания.

Basic groundwood pulp process, controlled grit size, two pocket grinder, surface characteristics, rotary drum washer.

5. Переведите предложения, учитывая значения предлогов *“for”, “from”*.

1) After screening the groundwood pulp is ready for any subsequent treatment.
2) From the blow tank the pulp goes through a screen to remove knots and uncooked chips.
3) Replacement requires considerable downtime for the machine and therefore lost production.
4) From the machine chest the stock flows to the paper machine.
5) The air-knife coaters are used for offset printing grades of paper.
6) After the refining the pulps must be stored to maintain a steady supply for the next stage.
7) Storage is needed to convert the surges of flow from a batch pulper to a continuous flow for the paper machine.

6. Переведите предложения, учитывая особенности перевода инфинитива (часть II, приложение 2, табл. 16).

1) Simple heating of the water is common to help break down the paper.
2) The stock is sent through screens and cleaners to remove foreign materials.
3) The basic function to be performed by the wet end is to separate the fibers and water and form the web of paper.
4) The paper web travels to the headbox to receive more stock and continue to form the continuous web of paper.
5) The speed at which the machine must be run to be economically competitive is very important.
6) To ensure a continuous flow of pulp it is generally necessary for a mill to have several digesters.
7) To prevent the water from being thrown back against the wire one must install deflectors between the rolls.

7. Прочитайте и переведите текст.

Chipping grinding

The first step in the manufacture of chemical pulp is chipping operation: the logs need to be reduced to small chips to allow the chemicals, or cooking liquor, to penetrate the fibers and dissolve the lignin. The chips must be of uniform size and must be screened to remove small and large chips. This operation is realized in the chipper.

The chipper is a large flywheel with knives mounted in its surface. The logs are fed to the flywheel through the chute at an angle such that the entrance of the knife into the log will be at a sharp angle to the axis of the log. The knife enters the log cutting and splitting it at the same time. The length of the chip can be controlled by a combination of the speed of the flywheel, the angle of the log and knife, and the extension of the knife beyond the face of the wheel.

The basic groundwood pulp process is simple: barked logs are held against an abrasive stone, which tears the fibers from the log, and water is used to wash the fibers from the stone. Modern stones are covered with blocks of synthetically produced abrasive materials of controlled grit size. These stones are also given a special surface treatment to help the removal of the fibers and control their quality.

A common form of grinding machine is the two-pocket grinder. The machine has two pistons, or pockets which are used to push the logs against the surface of the revolving stone. It should be noted that the logs are pressed against the stone such that their axes are parallel to the center of rotation of the stone. This method of grinding is most efficient in removing whole fibers from the wood and also in grinding the whole log and reducing waste. The use of two pockets allows one pocket to be filled, while the other is still partially full and is pressed against the stone.

The groundwood pulp from the grinders needs to be screened to remove large fiber bundles known as shives and other large materials such as slivers and knots.

After screening, the groundwood pulp is ready for any subsequent treatment or may be sent directly to the paper machine.

8. Ответьте на вопросы.

1) What is the aim of chipping?
2) How are logs fed to the chipper?
3) How can the length of the chips be controlled?
4) What does the basic groundwood pulp process consist of?
5) What are the modern stones covered with?
6) What is the advantage of two-pocket grinders?
7) Why is it necessary to screen the groundwood pulp from the grinders?

9. Замените пропуски нужным глаголом. Поставьте его в инфинитиве *(to dissolve, to wash, to penetrate, to remove, to be cut).*

1) The small chips allow cooking liquor … the fibers and … the lignin.
2) The chips must be screened … small and large chips.
3) The logs … enter the flywheel at an angle.
4) Water is used … the fibers from the stone.

10. Найдите термины эквивалентные данному определению *(groundwood pulp process; shives, slivers knots; chipper; two-pocket grinder).*

1) A large flywheel with knives mounted on its surface.
2) The process of tearing the fibers from the log.
3) The machine with two pistons which are used to push the logs against the revolving stone.
4) Large fiber bundles and other materials which must be removed from the pulp after grinding.

11. Переведите текст письменно со словарем.

With an annual production capacity exceeding 1,5 million tons this MMBD is Europe’s largest producer of folding boxboard from secondary fiber. The parent mill of the MMBD is located in Austria, where two board machines are in operation.

In January 2003 board machine 3 was rebuilt by our firm into a multi-ply fourdrinier machine with a new press (wire width 5.000 mm, operating speed approx 550 m/min). The main product is coated folding boxboard made of 100 % recycled furnish. Board machine (wire width 3.200 mm operating speed approximately 250 m/min prior to rebuild) also produces coated folding boxboard from 100 % recycled furnish.

УРОК 11

1. Выпишите из словаря следующие слова с транскрипцией и переводом.

Batch operation (n), continuous operation (n), seal (v), charge (v), empty (v), push (v), flow (n), mount (v), floor (n), cooking room (n), supply (v), deliver (v), chip bin (n), lid (n), dump (v), chip distributor (n), bridging (n), heat (v), increase (v); take place; blow valve (n).

2. Правильно прочитайте интернациональные слова и дайте их русский эквивалент. Выпишите с переводом подчеркнутые слова. Посмотрите их значение в словаре и запомните их.

Method ['meθəd], distributor [dɪs'trɪbju(:)tə], bolt [bəult].

3. Прочитайте ряды однокоренных слов. Переведите их, исходя из значения словообразовательных элементов.

Pulp (n), pulp (v), pulping (n), pulper;
charge (v), discharge (v);
digester (n), digestion (n);
supply (v), supplier (n);
fill (v), filling (n), filler (n), refill (v);
steam (n), steam (v), presteam (v).

4. Прочитайте и переведите словосочетания.

Cooking room floor, chip supply system, chip storage area, large mesh wire screen, blow valve, blow tank, existing cylinder mould.

5. Переведите предложения, учитывая значения слов *take (v) – брать; take place – происходить*.

1) The impregnation, cooking and extraction process take about 3 hours.
2) In the web leaving the press bonding has already started to take place.
3) While the paper is being wound on one reel, the other will be taken to the rewinder.
4) The presteaming usually takes place in the digester.
5) An early cylinder former takes its name from the fact that the wire screen is wrapped around the surface of a cylinder; the wire-covered cylinder is rotated and the web is formed on its outer surface.

6. Переведите предложения, учитывая значения наречий.

1) Mechanical pulp fibers include all of the above ingredients, <u>hence</u> the pulping process has a very high yield.
2) The air between the dryer and the web becomes saturated. <u>Accordingly</u>, the water vapour may be released in the areas between the dryers.

3) In the 8th century, the secret of paper manufacturing eventually spread to the Arabs.
4) Although the original screne were flat and operated in open boxes, higher production rates demand that we use closed screens today. Furthermore, some screens use holes rather than slots.

7. Переведите предложения, учитывая особенности перевода инфинитивных оборотов (часть II, приложение 2, табл. 17).

1) Wood fibers are well known to consist of cellulose.
2) The pulper is more likely to operate as a batch operation.
3) The wire is not a permanent part of the machine, it is expected to wear and have to be replaced.
4) The pulp bleached with a final peroxide stage is less likely to yellow later.
5) Headbox designs seem to be developing in two different directions.
6) The manufacturer wants the machine to produce a uniform web on a continuous basis and with uniform specific properties.
7) Fibers produced by sulphite process are considerably whiter and can be said to be cream coloured.

8. Прочитайте и переведите текст.

Pulping. Digester

Methods for cooking the chips can be divided into two basic types of operation: batch and continuous. The batch operations are carried out as sequential cooking steps and the continuous are carried out in a special tank that allows the chips to be fed in at one end and cooked pulp to be discharged at the other.

For the batch operation, the chips are loaded into a tank called a digester. The digester is sealed, the cooking liquor is charged into the digester and the pulping operation is carried out. At the conclusion of the cook, the digester is emptied and refilled for the next cycle. To ensure a continuous flow of pulp for the subsequent operations it is generally necessary for a mill to have several digesters mounted side by side on the digester or cooking room floor and operated with one chip supply and one liquor supply system. The chips are delivered to the chp bin from the chip storage area following the necessary screening operations. When it is desired to charge, or fill, a digester, the lid is removed from the digester, the chute placed in position to fill it and the chips dumped into the digester. It is desirable to use a chip distributor to spread the chips out to ensure level filling of the digester and prevent bridging, or formation of dome-shaped piles, in the digester.

It is necessary for the chips to be presteamed to heat them or to increase their moisture content. The presteaming usually takes place in the digester by opening the steam valve leading to it and blowing live steam in amount of the chips.

When the digester is filled the chute is swung out of the way and the lid is placed on top of the digester. The lid is usually a very heavy steel flange which is

secured to the top of the digester with large bolts and nuts. The cooking liquor can then be pumped into the digester.

When the cook is finished, the top lid on the digester is kept in place, maintaining the pressure inside the tank. The blow valve at the bottom can be opened and the pressure inside the digester is then used to push or blow the cooked chips from the digester through the pipe and into the blow tank or blow chest.

From the blow tank the pulp goes through a screen to remove knots and uncooked chips and on the pulp washer. The screen is a drilled plate or a large-mesh wire screen usually vibrated to facilitate passage of pulp and removal of oversize material from the surface.

9. Ответьте на вопросы.

1) What is the difference between batch cooking and continuous cooking?
2) Where does the continuous cooking take place?
3) Where is the batch pulping operation carried out?
4) How many digesters are there in a mill?
5) How many supply systems ensure a continuous flow of pulp?
6) Where are the chips delivered from?
7) How are the cooked chips pushed out from the digester?
8) Where do the chips go from the digester?

10. Подберите слова близкие по значению из данного ряда.

To carry out, to charge, to place, the amount, to put, to take place, to fill, the quantity.

11. Подберите термин эквивалентный данному определению *(screen, bridging, digester, lid, pulp washer, distributor).*

1) A device used to ensure level filling in the digester.
2) A sealed tank used for cooking operation,
3) Formation of dome-shaped piles in the digester.
4) Heavy steel flange which is secured on the top of the digester.
5) A device used to wash the pulp.
6) A drilled plate or a large-mesh wire.

12. Переведите текст письменно со словарем.

In August 2002 the firm won the order for five suction cylinders for producing the filler plies, including four formers, to replace existing cylinder mould units without vacuum. The scope of supply was completed with a white water system, a vacuum system and pneumatic controls. The previously delivered former for the back ply was intended to be used for the filler ply after the rebuild in September 2003. In addition, a double-felted press was ordered to replace the existing first press including hydraulic and electrical controls. The former installed for the back ply in October 2002 improved the formation. So the manufacturer ordered another two formers at the beginning of 2003. In the end seven formers will replace the two existing formers for back ply and top ply and five formers for filler plies.

УРОК 12

1. Выпишите из словаря следующие слова с транскрипцией и переводом. Запомните их произношение и значение.

Refiner (n), metering (n), blending (n), dilution (n), cleaning (n), bale (n), dry (v), bond (v), collapse (v), blade (n), bottom (n), maintain (v), defibered (a), storage tank (n), beater (n), role (n), bar (n), cone (n), shell (n), force (v), drive (v), amount (n).

2. Правильно прочитайте интернациональные слова и дайте их русский эквивалент. Выпишите с переводом подчеркнутые слова. Посмотрите их значение в словаре и запомните их.

Operate ['ɔpəreɪt], separate [ˈsepərət], original [ə'rɪʤɪn(ə)l], stationary ['steɪʃən(ə)rɪ], direction [d(a)ɪ'rekʃ(ə)n], spiral ['spaɪ(ə)rəl], refiner [rɪ'faɪnə], action ['ækʃ(ə)n].

3. Прочитайте ряды однокоренных слов. Переведите их, исходя из значения словообразовательных элементов.

Fine (a), refine (v), refining (n), refiner (n);
meter (v), metering;
blend (v), blending (n);
clean (a), clean (v), cleaning (n), cleaner (n);
bond (v), bonding;
store (v), storage;
cone (n), conical;
press (n), press (v), pressure, pressurized.

4. Прочитайте и переведите словосочетания.

High brightness pulp, sheet strength, small diameter roll.

5. Переведите предложения, учитывая значения слова *function (n) – функция; to be function of – зависеть от; function (v) – действовать.*

1) These dryers function to dry the web and may also be used to modify the web.
2) The functions of the headbox and slice are to deliver a ribbon of stock to the wire at uniform dilution, thickness and speed.
3) The number of dryers needed is a direct function of the amount of water that must be evaporated.
4) The dryer felt functions to hold the web tightly against the surface of the dryer to improve heat transfer.
5) The function of the presses in bringing the fibers together to promote bonding is of great importance.

6) The actual size of the holes of the wire is a function of the mesh size, the diameter of the strands used and the style weave.

6. Переведите предложения, учитывая особенности перевода глаголов *“should”, “would”* (часть II, приложение 2, табл. 21).

1) The surface of application system should be made as smooth and uniform as possible.
2) Washing stages would be inserted between each bleach and at the end of the process.
3) If unbleached pulp were desired the ground wood pulp would not require any further treatment.
4) It should be noted that about 60 % of the bleached pulp made in North America is used on-site to make paper and paperboard.
5) Provided this grade of paper were treated by necessary process, it would be perfectly usable.
6) Saturated steam should be used so that the latent heat of vaporization of water can be obtained and used to heat the web.
7) Either process would operate effectively if the wastepaper used were suitable for deinking.

7. Прочитайте и переведите текст.

Stock preparation operations
I. Pulping and refining

All the operations necessary for preparing the fibers begin with pulping and proceed through refining, metering and blending to dilution and cleaning.

The pulping operation has to liberate the fibers from the raw material being used by process. The fibers liberated form the wood by a pulp mill are formed into thick sheets of paper and bundled into bales. The pulp is not dried completely, but retains about 20 % moisture to prevent the fibers from bonding to one another or callapsing.

The machine used for pulping is called pulper. The pulper is equipped with rotating blades in the bottom, which serve to break the pulp into individual fibers. It may be operated as a continuous pulper, water and bales of pulp being added to maintain the desired volume and defibered stock being removed through the strainer plate in the bottom. However, the pulper is more likely to operate as a batch operation, because it is used to different types of pulp and sends them to separate storage tanks.

The refining is realized by the refiners. Modern mills tend to use different types of refiners. The original refiner, the beater, had a rotating wheel of roll with bars that beat against bars in a stationary plate. In the conical refiner the roll has been replaced by a cone with bars on its surface. The stationary plate has been replaced by a shell, or second cone, with bars on its inside surface. The inner cone is forced into the outer

cone, causing pressure to develop between the bars of the rotor and the stator. In the conical refiner, the stock is not carried through by the rotation of the roll, but is forced through by a pump in a direction parallel to the axis of the cone. Actually, the combined action to the rotation and pumping causes the fibers to follow a spiral route through the refiner. The continuous refiner requires the use of a pulper. The function of the pulper is to deliver defibered pulp in water suspension.

The disc refiner has two discs with raised bars on their facing surfaces. One of the discs rotates and the other is stationary. The stock is pumped in at the center of one of the discs and flows out between them. Some disc refiners are designed with both discs driven in opposite directions to increase the amount of action on the fibers. These refiners with both plates driven are called double-disc refiners. There is also a refiner called triple disc, which has one driven disc with bars on both sides sandwiched between two stationary discs.

8. Ответьте на вопросы.

1) What are the operations necessary for treating the fibers?
2) How are formed the fibers liberated from the wood?
3) What machine is used for pulping?
4) How do the pulpers operate?
5) What machine is used for refining?
6) What action is used in the conical refiners?
7) What action is used in the continuous refiners?
8) What action is used in the disc refiners?

9. Подберите слова близкие по значению из данного ряда.

To precipitate, to cause, to operate, to require, different, to collapse, to force, to work, various, to demand.

10. Переведите текст письменно со словарем.

In order not to exceed the shutdown time agreed for the rebuilt of the board machine, the firm did preparatory work during the regular shutdown. Furthermore, all tasks possible without shutting down the machine were completed beforehand.

During the pre-assembly phase, the firm renewed the screening system for filler plies, added an annex to the building to accommodate the control center and completed the infrastructure required for transport and installation of the new components.

As soon as the board machine was finally shut down, the structural work was started. Several floor zones had to be completely replaced, the machine beams and chests had to be changed and new foundations had to be made.

УРОК 13

1. Выпишите из словаря следующие слова с транскрипцией и переводом. Запомните их произношение и значение.

Steady (a), break (broke, broken) (v), occur (v), surge (n), flow (n), grade (n), change (v), mixture (n), chest (n), clean out (v), run out (v), basis weight, Jordan refiner (n), favor (v), cut (v), cutting (n), clump (v).

2. Правильно прочитайте интернациональные слова и дайте их русский эквивалент. Выпишите с переводом подчеркнутые слова. Посмотрите их значение в словаре и запомните их.

Convert ['kɔnvɜ:t], mixture ['mɪksʧə],regulator ['reguleɪtə], formation [fɔ:'meɪʃ(ə)n].

3. Прочитайте ряды однокоренных слов. Переведите их, исходя из значения словообразовательных элементов.

Convert (v), conversion;
continue (v), continuous (a);
flow (v), flow (n), flow meter (n);
desire (v), desirable (a);
form (v), form (n), formation, former (n);
dilute (v), dilution (n).

4. Прочитайте и переведите словосочетания.

Blend tank, machine chest, consistency regulator, stock preparation operation, fiber treatment, total stock flow, efficiency reject ration, flow rate, stock preparation line, production capacity.

5. Переведите предложения, учитывая значения наречий *off (adv) – удаление, отделение; out (adv) – наружу, вне, завершенность действия.*

1) The bark that is removed from the logs falls out through the openings and is transported away.
2) The blend chest can be cleaned out and refilled with new stock.
3) During the cooking operation, the temperature in the digester will rise to the desired degree and then the heater will be cut off or stopped.
4) Chains are used to tangle in the bark and tear the bark off the surface of the log.
5) These operations are carried out in a special tank. The chips are fed in at one end and cooked pulp is discharged at the other.

6. Переведите предложения, учитывая особенности перевода глаголов *“should”, “would”* (часть II, приложение 2, табл. 21).

1) It should be noted that the logs are pressed against the stone such that their axes are parallel to the center of rotation of the stone.
2) Such treatment would lower the brightness and the final yield would be so low that the advantage of using groundwood pulp would be lost.
3) The coatings tend to be quite smooth on their surface, as would be expected for beveled blade coaters.
4) If the basis weight of the paper is kept at the same value and the stock is refined more, the increased bonding should lead to a lower grade of the paper.
5) If the web were placed in contact with a dryer can that is too hot, the fibers on the surface of the web would dry and stick to the dryer surface.
6) If the coater were installed on the machine, the unwind would be eliminated and the web would come from a dryer section.

7. Прочитайте и переведите текст.

Stock preparation operations
II. Storage, metering, dilution

After the refining the pulps must be stored to maintain a steady supply for the next stage. Stock preparation operations are broken into a series of steps separated by storage tanks. Storage is needed to maintain supply if mechanical problems occur and also to convert the surges of flow from a batch pulper to a continuous flow for the paper machine. The blending and metering step may be operated in batches. If the grade of paper being made on the paper machine is to be changed, the mixture of stock being prepared must be changed first. The change is usually made by stopping the blending and metering. If there is a separate blend tank, it is emptied by pumping all stock to the machine chest. The blend chest can then be cleaned out and refilled with the new order. When the supply in the machine chest runs out, the chest can be quickly cleaned, if necessary, and the stock for the new order pumped in to be ready to supply the paper machine with the least time lost.

From the machine chest, the stock flows to the paper machine. The consistency regulator and a meter control the flow of fibers to the paper machine and help control the basis weight of the paper produced. Magnetic flow meters are now commonly used.

The Jordan refiner used at this point in the flow is designed to favor cutting of the fibers. Cutting may not always be the most desirable form of fiber treatment, but it is the one most useful at this point. Cutting will have a great effect on the formation of the paper. The stock blowing through the Jordan is generally about 2 % consistency, which is another factor that makes the Jordan a cutting machine.

Fibers have a strong tendency to clump together and must be diluted below 1 % consistency. This dilution requires a large volume of water, but large volume of water

are removed from the stock at the paper machine and can easily be pumped back to this point to dilute the stock.

8. Ответьте на вопросы.

1) What is the storage of the pulp after the refining needed for?
2) How are blending and metering operations carried out?
3) Where does the stock flow after blending and watering?
4) Where does the stock flow from the machine chest?
5) What devices control the flow of fibers?
6) What is the Jordan refiner designed to?
7) What is the role of cutting at this point of operation?
8) What is the role of dilution?

9. Подберите слова близкие по значению из данного ряда.

The tank, the grade, to convert, to clump, to maintain, to transform, the type, to support, the chest, to stick together.

10. Переведите текст письменно со словарем.

Board machine 2, which had undergone several rebuilds, with some parts being more than 50 years old, could no longer keep up with today's quality and production requirements. Therefore, the manufacturer decided to rebuild the stock preparation line and wet line in 2002 to improve product quality and to install a new press to increase production capacity.

In May 2002, the firm received the order for a former including white water system. During a brief shutdown in October 2002, this former for producing the back ply was installed and put into operation on an existing suction cylinder. The manufacturer was thus able to familiarize himself with the new former prior to the extensive rebuild planned for summer 2003.

УРОК 14

1. Выпишите из словаря следующие слова с транскрипцией и переводом. Запомните их произношение и значение.

Headbox (n), stock (n), slot (n), plugging (n), prevent (v), rate (n), hole (n), oversize (n), particle (n), specifique gravity (n), centrifugal cleaner (n), tangent to, motion (n), downward (adw), draw (v), efficiency reject ratio, lead (v), add (v), solve (v).

2. Прочитайте ряды однокоренных слов. Переведите их, исходя из значения словообразовательных элементов.

Solve (v), solution (n);
plug (v), plugging (n);
operate (v), operator (n), operation (n);
circle (n), circular (a), circulation (n);
force (n), force (v);
open (v), opening (n);
efficient (a), efficiency (n).

3. Прочитайте и переведите словосочетания.

Foam flotation technique, low consistency stock suspension, pressure sensitive adhesive drainage rate, heat transfer, constant temperature zone, printing ink residue, basis weight.

4. Переведите предложения, учитывая значения союза *since (cj): 1) так как; 2) с тех пор как.*

1) Since the screens and cleaners require consistencies of less than 1 % they are normally installed in the line leading to the headbox.
2) Since we lost 0,25 ton of fibers through the wire, the whitewater collected under the wire will average out to 0,1 % consistency.
3) Since the stock coming to the wet end is at a higher consistency than the web leaving it, we have a net gain of water in this part of the machine.
4) Since those figures were published, many mills have eliminated their effluent and are not sending any water to waste treatment.
5) Since the size of the slice opening affects the basis weight of the web we normally increase flow rate by increasing the head in the headbox.
6) Since the web is formed in thin sections, the machine can be run faster.

5. Переведите предложения, учитывая особенности перевода герундия (часть II, приложение 2, табл. 24).

1) Maintaining a constant load on the stone is important.
2) Mechanical pulping can be achieved by grinding or refining.
3) The first step in controlling effluent discharge is to reuse as much of whitewater as possible.
4) Primary treatment consists of removing suspended solids by settling in a clarifier.
5) Increasing the coat weight increases the possibility of disruption of the surface.
6) The largest obstacle to increase use of wastepaper is the cost of collecting and sorting.
7) Besides removing water and consolidating the web, the pressing smoothes the surface of the web.

6. Прочитайте и переведите текст.

Screening and cleaning

Following dilution to below 1 % consistency for the headbox, the stock is sent through screeners and cleaners to remove foreign materials. A screener is a flat piece of metal with slots which are wider at the bottom than at the top, to prevent plugging. The dilute stock is forced through the screen by pressure, and the screen is vibrated. The vibration helps to prevent plugging. Although the original screens were flat and operated in open boxes, higher production rates demand that we use closed screens today. Furthermore, some screens use holes rather than slots, but the same principles are used in most closed screens in today's mills. These screens remove oversize particles but do not remove heavy particles.

Heavy particles with a specific gravity greater than that of the fibers, are removed with a centrifugal cleaner. The total stock flow enters the cleaner and is pumped into the cleaner tangent to the outside wall. This angle of entry creates a circular flow inside the cleaner. The centrifugal force created by the circular motion causes the heavier material to be thrown to the outside of the cleaner. There are also openings in the top and bottom of the cleaner. The heavy materials must flow to the bottom and be rejected, that is why there must be some flow in that direction. However if too much downward flow is allowed enough stock will not be drawn out of the top. The balance is called efficiency – reject ratio. For the purpose of maintaining high production rates, it is desirable to have a low reject rate but at the same time the efficiency of removal of harmful materials must be kept at acceptable level. The problem is usually solved by using several cleaners in parallel to reduce the flow rate through each cleaner and also by collecting the rejected materials and recleaning them.

Since the screens and cleaners both require consistencies of less than 1 %, they are normally installed in the line leading to the headbox. The amount of water needed to dilute the stock to this level is considerable and will not be added until necessary.

7. Ответьте на вопросы.

1) What kind of screeners are used today?
2) What do the screeners remove?
3) What machine removes heavy particles?
4) What is efficiency – reject ratio?
5) How is the efficiency – reject balance supported?

8. Подберите слова противоположные по значению из данного ряда.

Inside, the top, to accept, downward, the bottom, upward, to reject, outside.

9. Замените пропуски нужным словом *(tangent to, headbox, specific gravity, plugging).*

1) The slots are wider at the bottom, than at the top to prevent …
2) … of heavy particles is greater than that of the fibers.
3) The stock flow is pumped … the outside wall of the cleaner.
4) The consistency of the pulp for the … must be below 1 %.

10. Переведите текст письменно со словарем.

The stock is thickened to a stock consistency of 3 % using both disc filters and screw presses. A heater is used to heat up and homogenize the stock and to blend in bleaching agents. In the disperger, any printing ink residues still on the fibers are now detached and optically disturbing particles are reduced in size to below the visibility limit. At the same time peroxide is added directly in the disperger for the oxidative bleaching stage.

The crumby stock is then fed via a screw system to a new type of high-consistency bleaching tower with discharge. In the flotation system 2 the ink particles detached by dispersion are removed.

УРОК 15

1. Выпишите из словаря следующие слова с транскрипцией и переводом. Запомните их произношение и значение.

Fourdrinier paper machine (n), enter (n), slice (n), thickness (n), adjustable (a), velocity (n) relative (a), woven material (n), device (n), hydrafoil (n), keep (v), wet end (n), foil (n), suction (n), locate (v), web (n), couch roll (n),shower (n), squeeze (v), felt (n), dryer can (n), hood (n), size press (n).

2. Правильно прочитайте интернациональные слова и дайте их русский эквивалент. Выпишите с переводом подчеркнутые слова. Посмотрите их значение в словаре и запомните их.

Function ['fʌŋkʃ(ə)n], series ['sɪ(ə)ri:z], generate ['ʤenəreɪt], couch-roll ['kauʧrəul], centrifugal ['sentrɪ'fju:g(ə)l].

3. Прочитайте ряды однокоренных слов. Переведите их, исходя из значения словообразовательных элементов.

Invent (v), invention (n), inventor (n);
deliver (v), delivery (n);
adjust (v), adjustable (a);
thick (a), thicken (v), thickness (n);
locate (v), location (n);
vapour (n), evaporate (v), evaporation;
dry (a), dry (v), drying (n), dryer (n).

4. Прочитайте и переведите словосочетания.

Wire level, suction device, heat transfer, heat loss, water resistance, modern dryer section.

5. Переведите предложения со сложными наречиями *as well as – так же как; as long as – пока; as soon as – как только*.

1) Formation of the web begins as soon as the wire web decreases.
2) The headbox and slice work together to control the volume or weight of fibers as well as the flow rate.
3) The water is forced from the stock by the pressure created by the wires as well as by the centrifugal force.
4) The temperature of the web will not rise above the evaporation temperature of the water as long as there is water in the web.

5) The application system needs a special cooking equipment and several tanks for pigment dispersion as well as storage tanks for these ingredients after they are prepared.

6. Переведите предложения, учитывая особенности перевода *ing*-форм.

1) The temperature and times in the digester vary greatly with the type of process and type of wood being cooked.
2) The oxygen, along with bacteria, oxidizes the organic materials, thus lowering the BOD.
3) The knife enters the log at a sharp angle, cutting and splitting the log at the same time.
4) Increasing the diameter of the rolls reduces the tendency for them to throw water back, up to the wire.
5) The equipment used for the bleaching operations consists primarily of closed tanks into which the pulp is pumped in water suspension after being mixed with the bleaching chemicals.
6) The tumbling action on the bark can cause some damage to the ends of the logs producing brooming effect.

7. Прочитайте и переведите текст.

The fourdrinier paper machine (I)

The machine name comes from type of wet end invented by the brothers Fourdrinier in about 1800. The cleaned, screened and diluted stock enters the headbox. The functions of the headbox and slice are to deliver the stock to the wire at uniform dilution, thickness and speed. The headbox is a tank above or beside the wire, so it can deliver the stock to the wire through the slice. The slice is narrow opening in the headbox through which the stock flows. The slice must be adjustable so that the thickness of stock can be controlled. The headbox and slice work together to control the volume or weight of fibers as well as the flow rate (velocity of the flow relative the speed of the wire).

The wire is a continuous belt of woven material, originally metal wire but now more frequently plastic materials. The wire travels over a series of rolls and/or devices called hydrafoils which both keep the wire level and remove water. As the stock and wire pass through the wet end, water is removed first by gravity, next by low pressure generated on the back side of the rolls and foils and finally by suction devices located under the wire. The paper web leaves the wire at the couch roll and the wire travels back below the forming table to the headbox to receive more stock and continue to form the continuous web of paper. Showers below the forming table clean the wire on its return to the headbox.

The web leaves the fourdrinier section at the couch roll, and enters the press section. The presses are hard rolls that squeeze the paper gently to remove water. Their other function consists of bonding the fibers. The web leaves the press section

and passes around a series of steam-filled drums (called dryer cans) where the remaining water is removed by evaporation. Felts are used to hold the web tightly against the drums to improve heat transfer. There are also series of short vertical draws between the dryer cans where evaporation takes place freely. Modern dryer section is enclosed in a small hood to prevent heat loss from the hot dryer cans.

A size press in the dryer section may be used to apply a chemical solution to the surface of the web to improve its water resistance.

8. Ответьте на вопросы.

1) What is the origins of the fourdrinier paper machine name?
2) What stock enters the headbox?
3) What is the function of the headbox and the slice?
4) Where does the wire travel?
5) How is water removed from the stock at the wet end of the machine?
6) Where does the web go after leaving the fourdrinier section?
7) Where does the web go after leaving the press section?
8) Where is modern dryer section enclosed?
9) What is the size press used for?

9. Подберите термин, эквивалентный данному определению *(size press, headbox, hydrafoil, slice, wire, presses, dryer cans, shower).*

1) A tank situated above or beside the wire.
2) A narrow opening in the headbox through which, the stock flows.
3) A continuous belt of woven material.
4) A device which keeps the wire level and removes water.
5) Devices below the forming table which clean the wire.
6) Hard rolls that squeeze the paper to remove water.
7) Steam filled drums which remove the water by evaporation.

10. Переведите текст письменно со словарем.

Water can drain freely from the fibers on the wire, but without the aid of suction equipment consistencies of about 16 % are possible. It we assume a consistency of 12 % for the sheet leaving the wire, we see that the ton of fibers will take with 7.3 tons of water, indicating that 241.45 tons of water passed through the wire. Since we also lost 0.25 ton of fiber through the wire the whitewater collected under the wire will average out to 0,1 % consistency. The water that comes out closest to the breast roll will be richer in fibers than the water removed further down the wire or through the suction devices. The richest water is usually collected separately and sent to the stock preparation area to be used to dilute the fibers coming from there.

УРОК 16

1. Выпишите из словаря следующие слова с транскрипцией и переводом. Запомните их произношение и значение.

Reel (n), rewinder (n), stack (n), smooth (v), wrap (v), shaft (n), friction (n), trim (v), slitter-knife (n), sharp (a), edge (n), loop (n), deposit (v), dump (v), couch pit (n), width (n), narrow (a).

2. Прочитайте ряды однокоренных слов. Переведите их, исходя из значения словообразовательных элементов.

Wind (v), rewind (v), rewinder (n), winder (n);
sharp (a), sharpness (n);
deposit (v), deposition;
wide (a), width;
start (v), start up (n);
circle (n), circulate (v) recirculation (n);
increase (v), decrease (v);
mix (v), mixture (n).

3. Прочитайте и переведите словосочетания.

Recirculation loop, section equipment, mill site, breast roll, water collection pit, water jet, warm-up zone, increasing rate zone, slitter knife, high specific energy consumption, screening efficiency.

4. Переведите предложения, учитывая разные значения слова *result: 1) result (n) – результат; 2) result (v) in – привести к; 3) result (v) from – образоваться (в результате чего-то).*

1) All the wastepaper that is made during start up and that results from any breaks can be reprocessed into paper.
2) The bent blade is flexed; this results in its possibility to allow higher cost weights.
3) As a result, pulp and paper manufacturers have been able to make significant reductions in their requirements for fossil fuels and other forms of purchased energy.
4) In the pulping process there is great fiber damage with resulting loss in strength.
5) Chemical pulping results in high strength of the fibers and the possibility for high brightness of the pulp.
6) Fiber cutting will result in a certain amount of fiber shortening.

7) If the cooking cycle lasts too long, the reaction between the cellulose and the cooking liquor will go too far and considerable degradation of the fibers will result.

5. Переведите предложения, обращая внимание на глагольные формы.

1) Manufacturing of paper involves refining various types of pulps and then blending them together in combination with specific additives.
2) The process of removing fibers from the solid wood is called “pulping”.
3) The hood may be a complete building enclosing the entire dryer section, with slot for the wet web to pass in and another slot for the dry web to pass out.
4) This type of paper is made by blending different sorts of pulp.
5) Some shortened fibers are known to fill in between longer fibers and increase strength in the right circumstances.
6) Liquids may be circulated through the rolls to maintain uniform temperatures.
7) The wire is woven or welded together to be delivered to the papermill as an endless belt.

6. Прочитайте и переведите текст.

The fourdrinier paper machine (II)

At the end of the paper machine there are the calendar, reel and rewinder. The calendar is a stack of rolls designed to press the sheet, to smooth it and control its thickness. The reel winds the web into a roll. The web is wrapped around the shaft of the reel, when the machine is started, and held there by friction. Every machine has at least two winder reels. While the paper is being wound on one reel, the other will be taken to the rewinder to be rewound. The rewinder also must trim the web to the width needed by the process that will follow. The rewinder therefore includes in its design slitter knives to cut the web into narrower webs. The knives are round discs with sharp edges and continually cut the web as it passes under them.

The first operation in the start up of the paper machine is to get all the parts of the machine running at the same speed. With all parts running, the stock is pumped into the headbox, which has already been filled with water; water is also running through the slice and wire and back through the recirculation loop.

As the consistency of the headbox increases a web will begin to be deposited on the wire. The fourdrinier section must be equipped with a tank under the couch roll to allow the web to be dumped, mixed with water and recirculated until the thickness of the web has reached the desired level. This tank is called couch pit.

7. Ответьте на вопросы.

1) Where are calendar, reel and rewinder situated?
2) How is the web held on the reel?
3) What is the function of the rewinder?

4) What is the first operation in the start up of the paper machine?
5) What happens to the web when the consistency of the headbox increases?
6) How is the desired level of the web thickness obtained?

8. Подберите термин эквивалентный данным определениям *(couch pit, calendar, slitter knives, rewinder, reel).*

1) A stack of rolls designed to press and smooth the sheet.
2) A device which winds the web into a roll.
3) A device which takes the second end of the web to be rewound.
4) A device used to cut the web into narrower webs.
5) A tank under the couch roll where the web is dumped and mixed with water.

9. Переведите текст письменно со словарем.

To keep up with the constantly increasing demands on paper qua-
lity and at the same time reduce production cost, the manufacturer initiated an optimization of the screens. Up till then the screens all operated with rotors with four continuous foils each, together with milled baskets. Despite large slot widths of 0.45 mm, the mill could only achieve the required output by running the screens with very high rotor speeds which meant a high specific energy consumption.

This resulted in disturbing pulsations, while screening efficiency was not sufficient for the high paper qualities demanded by the market. In addition the rotors and screen baskets exhibited very heavy wear. A rebuilt of the paper mill was inevitable.

УРОК 17

1. Выпишите из словаря следующие слова с транскрипцией и переводом. Запомните их произношение и значение.

Lightweight paper (v), heavy paper (n), paperboard (n),drain (v), vat (n), catch on (v), stick (v), pick up (v), proceed (v), layer (n), ply (n), corrugating (a), clippings (n. pl), boxboard (n), accumulate (v).

2. Прочитайте ряды однокоренных слов. Переведите их, исходя из значения словообразовательных элементов.

Product (n), produce (v), production (n);
require (v), requirement (n);
wire (n), wireless;
accumulate (v), accumulation;
advantage (n), disadvantage;
different (a), differ (v), difference (n);
side (n), inside (n), outside (n).

3. Прочитайте и переведите словосочетания.

Multicylinder machine, gray inside layer, corrugating and carton clippings, fiber savings, higher sheet caliper, old sheet roughness, overall sheet quality.

4. Переведите предложения, учитывая значения слова *once (adv): 1) однажды, один раз; 2) служит для усиления союзов «когда», «если».*

1) With continuous refiners the stock is pumped through once.
2) It was assumed that the water could reach the surface easily and need only be evaporated once.
3) Once ready for use, the coating material must be metered together, blended, screened, stored and pumped to the application system.
4) Once the web has been warmed, the temperatures may go as high as 200^{o}C.
5) Once the stock has been broken down into original fibers, the roll can be lowered until it is close enough to beat on the fiber.
6) Once ready for use, pigment dispersions must be metered, blended, screened, stored and pumped to the application system.

5. Переведите предложения, учитывая перевод модальных глаголов (часть II, приложение 2, табл. 7).

1) The capacity of mill can vary from 50 to over 3000 tons of paper product.
2) Photocopier paper must have excellent brightness, printing surface and must not curl in the photocopier.
3) The initial part of the drum barker may be claused to retain water. Later sections, or entire drum barker, may be open.

4) The water squeezed from the paper should be absorbed by the felt, which therefore has to be porous.
5) If superheater is used to heat the web, it is to be cooled to the condensation temperature.
6) Water that is thrown back up can be harmful to the sheet and has to be avoided.
7) Saturated steam should be used so that the latent heat of vaporization of water can be obtained and used to heat the web.
8) This grade of paper is to be bleached to a high brightness.
9) Chips have to be of uniform size and must be screened to remove small and large chips.

6. Переведите предложения, обращая внимание на разные глагольные формы.

1) The sulphite process uses sulphur dioxide dissolved in water to produce an acid condition and to help break down the lignin.
2) The slotted plates allow water and the dispersed ink to pass through while rejecting the fibers.
3) Calcium carbonate scale can plug pipes quickly, requiring that the recovery operation be shut down and the pipes be cleaned.
4) If printed paper were reclaimed for reuse in the manufacture of white paper, the ink would be removed by some form of cleaning operation.
5) In this phase we want a felt with a large pore structure, but do not want the felt to have a rough texture.
6) Each mill must develop its own system of equipment based on the grades to be produced and the type and complexity of raw materials to be processed.

7. Переведите предложения, обращая внимание на степени сравнения прилагательных и наречий (часть II, приложение 2, табл. 2).

1) The surface of this paper is as smooth as is prescribed by the standard.
2) The coating of this boxboard is less important than that of glossy paper.
3) These felts are dryer than those ones.
4) The most popular wires are woven.
5) This weave of the wire is finer and therefore it can interfere with the removal of water from the web.
6) The more is the cost of this paper the better are its properties.

8. Прочитайте и переведите текст.

The cylinder machine or paperboard machine (I)

The fourdrinier machine is excellent for the production of lightweight paper. However, manufacture of heavy paper or paperboard requires the delivery of a large amount of stock to the wire, which drains slowly and requires that the machine be run at reduced speed. The solution to this problem is found in the use of multicylinder machine. The paper is formed on the surface of wire-covered cylinders in the cylinder forming vats. The vats are partially filled with dilute fiber suspension similar

to the stock pumped to the head box of the fourdrinier. The water flows through the wire on the surface of the cylinder and the fibers catch on the wire. Once the fibers are accumulated on the wire, the web of paper starts to form.

A felt is pressed against the wet web by the couch roll at the top of each forming cylinder. The wet web sticks to the wet felt and is removed from the forming cylinder at this point. The felt and web picked up from the first cylinder proceed to the second cylinder, where they are pressed against the web formed and picked up. The felt continues through the forming section, picking up sheets from all the vats in succession. If each cylinder forms a web that is 0.003 in thick a machine with 5 cylinders can produce a web with total thickness of 0.015 in. Since the web is formed in thin sections, the machine can be run faster than if the total thickness were made in one layer. Another advantage of this type of former is that the formation of each layer will be better than if the total thickness were made in one former.

The greatest advantage of this type of former is that the different plies do not need to be made from the same stock. It is customary to make board that is white on the outside and gray on the inside. The gray inside layers are made from a mixture of old newspapers, corrugating and carton clippings. The use of different types of stock gives the board the name boxboard.

9. Ответьте на вопросы.

1) What is fourdrinier machine used for?
2) What does the multicylinder machine produce?
3) Where is the paper formed in the multycylinder machines?
4) What is pressed against the wet web?
5) Why can the wet felt remove the wet web?
6) How is the thickness of the web obtained?
7) What is the greatest advantage of the multicylinder former?

10. Подберите слова близкие по значению из данного ряда.

To blend, the opening, to work, the purpose, to mix, the slot, the aim, to run

11. Переведите текст письменно со словарем.

Equal smoothness on both sides of the sheet is a formidable task. Smoothness is not only higher profitability through improved quality and fiber savings, this is also a reduction in calendering and higher sheet calipers. Perhaps the biggest benefit of all happens beyond the paper mill. It happens on the printing presses, where more consistent printability on both sides of the sheet occurs.

In order to improve the age-old sheet roughness, the firm explored the concept of building a laminated construction utilizing non woven technology to improve overall sheet quality.

УРОК 18

1. Выпишите из словаря следующие слова с транскрипцией и переводом. Запомните их произношение и значение.

Felt (n), remove (v), promote (v), web (n), stack (v), size-presse (n), sheeter (n), roll (n), reel (n), core (n).

2. Прочитайте ряды однокоренных слов. Переведите их, исходя из значения словообразовательных элементов.

Bond (v), bonding;
dry (a), dry (v), dryer (n), dryer can (n);
arrange (v), arrangement (n);
stack (v), stack (n);
apply (v), application (n);
equip (v), equipment (n);
sheet (n), sheet (v), sheeter (n);
wind (v), rewind (v), rewinder (n);
complicate (v), complicated (a), complication (n).

3. Прочитайте и переведите словосочетания.

Boxboard machine, cylinder board machine, calendar stack, water balance, step diffuser inserts, improved profile and formation characteristics.

4. Переведите предложения, учитывая значения слова *cause: 1)(n) – причина; 2)(v) – заставлять, вызывать.*

1) There must be a device for controlling the temperature of the rolls in the calendars. The cause is that the rolls may expand enough to create increased pressure in the hot areas.
2) This type of dryer may cause damage to the coating.
3) The drum causes the logs to tumble over one another creating a rubbing action.
4) The surface of the web is not much resistant to abrasion and may cause dusting problems when printed.
5) It must be remembered that the main purpose of the cooking operation is to cause the liquor to penetrate the chips.
6) Increased temperature in the digester will cause the chips to give off steam and other gases.

5. Переведите предложения, учитывая значения слова *“one”* (часть II, приложение 2, табл. 11)

1) Theoretically, one could design the cone of a conical refiner to have any angle, but most are around 45°.
2) There are many different processes suitable for secondary treatment and a mill must choose the one most suited to its requirements.
3) The former of this design has a headbox of different style, more similar to the ones used with fourdrinier formers.
4) One of the disadvantages of the kraft process is that small amounts of highly unpleasant smelling sulphur compounds are emitted.
5) The dryer cans are mounted in two horizontal rows such that the web can be wrapped around one in the top row and then around one in the bottom row.
6) The jet on the front side of the machine is fixed and the back one is movable.

6. Переведите предложения, обращая внимание на глагольные формы.

1) Fibers have a strong tendency to clump together and would make very lumpy paper if not diluted to below 1 % consistency.
2) The foils create a very low pressure pulse in their lead edge and are less likely to cause stock jumping.
3) There is always a need for some fresh water to be used by the pulp and paper mill.
4) By rotating the rod in the direction opposite to the web travel, the foreign particles causing scratches can be removed.
5) After pulping operation, the spent cooking liquor is removed from the pulp and burned to recover the cooking chemicals.

7. Прочитайте и переведите текст.

The cylinder machine or paperboard machine (II)

After all the layers are picked up by the felt, the web is sandwiched between two felts and pressed to remove the water and promote bonding.

The greater thickness of the web requires that it be passed through more presses and dryers than the web in the fourdrinier machine. The larger number of dryer cans may cause the vertical arrangement of the stack. If the cans were stacked two-high as in the fourdrinier machine, the machine would be too long. The boxboard machine generally does not have a size press. Any chemicals to be applied to the web are applied in special devices on the calander stack.

The cylinder board machine must also be equipped with a winder or reel. Many of the older cylinder board machines were equipped with sheeters on the dry end to cut the web immediately into sheets. Heavy or thick paperboard is rather stiff, and if it is wound onto a reel and kept there for a long time, it may become curled. Therefore it is better to sheet it immediately or wind it on large-diameter cores.

Newer printing and cartonmaking lines are being developed that use rolls rather than sheets. Therefore, most machines today wind the web on reels and are equipped with rewinders that cut the web into narrower rolls as on the fourdrinier machine.

A water balance can also be developed for the cylinder machine. The flow for this type of machine is more complicated since there are several forming devices operating at the same time and the water from vats using the same stock may be blended together.

8. Ответьте на вопросы.

1) How are all the web layers treated?
2) Why does the dryer stack have vertical arrangement?
3) How are the chemicals applied on the web?
4) Why are the old cylinder board machines equipped with sheeters?
5) What do the modern board machines use in order to preserve the paperboard?
6) Why is a water balance necessary for the cylinder machine?

9. Замените пропуски нужными глаголами. Поставьте их в активной или пассивной форме *(to promote, to wind, to be, to remove, to become).*

1) The water …
2) If the cans were stacked two-high, the machine … too long.
3) The sheet of board … curled.
4) The machines … the web on reels.

10. Переведите текст письменно со словарем.

The latest former generation has the following innovations and benefits

- Top lip evenly supported over its entire length.
- Uniform distribution of the suspension across the machine width.
- Replaceable step diffuser inserts to generate optimum turbulence.
- Improved profile and formation characteristics.
- Ease of operation and maintenance.

This allows to improve the technological properties of board and packaging paper and significantly upgrade the cylinder forming technology.

The centrifugal distributor at the beginning of the flow channel of the former ensures uniform and homogeneous distribution of the suspension across the entire width thanks to the radially arranged hoses of equal length.

УРОК 19

1. Выпишите из словаря следующие слова с транскрипцией и переводом. Запомните их произношение и значение.

Perform (v), property (n), slice (n), degree (n), tapered header (n), manifold, tube (n), taper (n), provide (v), hollow (a), rectifier (n), bunched tube (n), twin-wire machine (n).

2. Прочитайте ряды однокоренных слов. Переведите их, исходя из значения словообразовательных элементов.

Uniform (a), uniformity (n);
introduce (v), introduction (n);
taper (n), tapered (a);
provide (v), provision (n);
slow (a), slow down (v);
include (v), inclusion (n);
wire (n), twin-wire (a).

3. Прочитайте и переведите словосочетания.

Flow-spreading problem, square-shaped box, rectifier roll headbox, bunched tube design, bunched tube headbox, wear resistance.

4. Переведите предложения, обращая внимание на союз *whether (cj) – ли.*

1) The first feature of great importance is whether the coater is to be installed as an on – or off – machine operation.
2) Water is drawn into the smaller capillaries whether they be in the paper or in the felt.
3) Equally important are whether both sides need to be coated and whether it is desirable to apply more than one layer of coating on one or both sides of the web.

5. Переведите предложения, учитывая значения слова *“that”, “those”* (часть II, приложение 2, табл. 12).

1) There are pumps that can deliver 6 % consistency pulp to thickeners.
2) The mechanical barker that treat a large number of logs at a time is called a drum barker.
3) The amount of water removed in the press section is much less than that removed in the forming section.

4) The time for the cook for kraft pulp is usually shorter than that for the sulphate pulp.
5) Mechanical barkers can be divided into major categories: those that handle a large number of logs at the same time and those that treat individual logs.
6) The properties of the sulphite pulp are quite different from those of the kraft pulp.
7) The strength of the secondary pulp is not as good as that of virgin fiber.
8) The washers may be simple drum washers like those used in the chemical pulping.

6. Переведите предложения, обращая внимание на глагольные формы.

1) The grooves cause the surface of the log next to the abrasive stone to be alternately compressed and relaxed.
2) At this stage the main task is eliminating dirt and admixtures.
3) The manufacturer waits for the cost of virgin pulp to rise so high that the secondary fiber cost can be tolerated.
4) Chemical pulping involves chemically dissolving the lignin fraction.
5) Two pistons of the grinding machine are used to push the logs against the surface of the revolving stone.

7. Прочитайте и переведите текст.

Forming devices (The wet end)

The basic function to be performed by the wet end is to separate the fibers and water in such a way as to form the web of paper. At the same time we want the machine to produce a uniform web on a continuous basis and with uniform specific properties. Uniformity is the main problem which affects the design of the system that delivers the dilute stock to the wire. It was necessary to know whether it was possible to develop a device to produce the web of paper or paperboard with minimum variations in web properties across the machine. The problem is to convert the flow from a pipe to a wide flow which will pass through the slice as a narrow ribbon of stock.

The early machines were rather simple and had few parts, not having the degree of specialization of today's machines. The most common solution of the flow-spreading problem has become the tapered header.

The stock is introduced at the wide end of the manifold at the moment when it is forced to flow out the side through the tubes into the headbox.

The taper maintains the pressure and degree of turbulence in the flow. The corners of the square-shaped boxes provide areas in which the flow can slow down or become stagnant. To prevent this a perforated hollow roll, called a rectifier is included. This roll is rotated, causing the stock to flow in through holes on one side, be mixed with other flows and pass out the holes on the other side.

Headbox designs at this time develop in two different directions. One direction is a large pressurized headbox which uses rectifier roll to generate uniform flow and turbulence. The other direction is towards the use of the bunched tube design. Both types of headboxes are being used successfully. The rectifier roll headbox is more commonly found on the flat fourdriniers. The bunched tube headbox is used in cylinder formers or twin-wire machine.

8. Ответьте на вопросы.

1) What is the basic function of the wet end of the paper machine?
2) What characteristic of the paper produced is the most important?
3) What improvement could produce a uniform web of paper?
4) What is the most common solution of the flow-spreading problem?
5) What is the role of the taper?
6) What are the two types of headboxes which ensure the uniformity of the web?

9. Подберите слова близкие по значению из данного ряда.

To perform, to influence, drilled, to work out, to affect, to carry out, to develop, perforated.

10. Переведите текст письменно со словарем.

This is a new surface coating system (cover) tailored to provide a unique combination of anti-adhesion and wear resistance. It has been specifically developed for any paper machine roll or drying cylinder suffering from excessive build-up of foreign particles or/and build-up of deposits.

Any rolls or drying cylinders following coaters and size presses are prime candidates for this coating system. The surface characteristics of the coating significantly reduces the sticking tendency and also allows to easily remove any accumulation of foreign particle build-up.

УРОК 20

1. Выпишите из словаря следующие слова с транскрипцией и переводом. Запомните их произношение и значение.

Bulky (a), woven (a), nip (n), squeeze (v), moisture (n), content (n), tear (v), reverse (a), suction (n), bottom (n), quadrant (n), wrap (v), shell (n), simultaneously (adv), drill (v), cloth (n).

2. Прочитайте ряды однокоренных слов. Переведите их, исходя из значений словообразовательных элементов.

Service (n), serve (v);
solid (a), solid (n), consolidate (v), consolidation (n);
force (n), force (v), together;
desire (v), desirable (a), undesirable (a);
station (n), stationary (a).

3. Прочитайте и переведите словосочетания.

Press-section, fiber-to-fiber bonding, press roll, high moisture content, press felt moisture content, bottom roll, inner suction quadrant, white water circuit.

4. Прочитайте предложения, учитывая значения слова *due (a) – обусловленный; to be due to – быть вызванным чем-то; due to – из-за, благодаря.*

1) Some of the problems of maintaining a low moisture content in the felt is due to the speed of the machine.
2) Due to the presence of lignin the papers do not have any degree of permanence and yellow quickly.
3) The steel rolls at the bottom of the calenders tend to bend due to their weight and the pressure used.
4) The diameter in the rolls of the calender expands due to the heat generation.
5) The fountain applicator applies the coating with a lower pressure due to a narrow slot at the top where the coating is applied to the web.
6) Due to the nonuniform temperatures across the face of the drum wet streaks or nonuniform drying of the paper may occur.

5. Переведите предложения, обращая внимание на выделенные слова.

1) Once the material to be dried has been raised to the maximum temperature, the limiting factors in the rate of evaporation begin to function.

2) The water is drawn in both directions at the same time, since both directions should be hotter than the center of the web.
3) Calcium was originally preferred base because of its low cost and availability.
4) The most common means for controlling the air in the dryer section is with dryer hood.
5) The stock is introduced at the wide end of the manifold at the moment when it is forced out the side through the tubes into the head box.

6. Переведите предложения, обращая внимание на разные глагольные формы.

1) The paper being wound on one reel, the other will be taken to the rewinder to be rewound.
2) The beveled blade coaters are susceptible to problems with scratches caused by particles trapped under the blade, or a breakdown of the coating caused by the high shear conditions found between the blade and the web.
3) Bleaching is shown to perform two functions: improving of the whiteness and improving of the permanence of the whiteness.
4) A common sequence for high-brightness pulp would be: chlorination, extraction, hypochlorite and either peroxide or chlorine dioxide. Washing stages would be inserted between each bleach and at the end.

7. Прочитайте и переведите текст.

Press section

The sheet leaves the forming device and is delivered to the press section at about 12 % to 16 % consistency. The amount of water removed in the press is much less than that removed in the forming section. The press section serves a second function beside the removal of water: consolidation of the web. The fiber-to-fiber bonding starts when the fibers are forced together during the pressing operation and water is expelled simultaneously. The web can be dried without wet pressing, but it will be bulky and will not have the strength that can be created by wet pressing.

The felt used in the press today is a woven cloth. The felt passes between the two press rolls with the paper. As the paper and felt travel into the nip, or line of contact between the rolls, they are compressed together. Water is squeezed from the paper and is absorbed by the felt which is porous.

If a web with a high moisture content is pressed either too quickly or with too much pressure, the flow rate will become so great as to tear the web or blow the web out of the nip. To increase the potential operating speed of the machine, it is desirable to have the press felt moisture content as low as possible when it comes into the nip.

Some of the problems of maintaining a low moisture content in the felt are due to the speed of the machine as the speed is increased, the roll will carry more water into the nip. As the amount of water increases, the reverse flow increases, and the web may be blown out from the nip with the water.

One solution to this problem is the suction press. In the suction press the bottom roll has a rotating outer shell and stationary inner suction quadrant. The rotating outer shell is drilled to allow air and water to be drawn into the section of the roll where the suction quadrant is located. With the suction press, it is desirable to wrap the suction roll with the felt outside the nip to allow air to be drawn through the felt and web. The exact positioning of the suction quadrant is usually such that a little air will be drawn through the felt on both intake and exit sides of the nip. However, if the amount of air drawn in is too great, it will be difficult to maintain the desired vacuum in the quadrant. The suction press allows higher speeds of operation than the plein press.

8. Ответьте на вопросы.

1) What is the function of the press-section?
2) What is the function of the felt in the press section?
3) What is the influence of the press felt moisture content on the speed of the paper machine?
4) What kind of press may solve the problem of increasing the speed of the machine?

9. Переведите следующие словосочетания.

Плетеная сетка, выжимать воду, разорвать бумажное полотно, отсасывающий квадрант, зона прессования или линия контакта между валами.

10. Подберите слова противоположные по значению из следующего ряда.

Simultaneously, outer, rotating, intake side, low, inner, exit side, sequencially, stationary, high.

11. Переведите текст письменно со словарем.

On September 8 2004, board machine № 2 at M.M.F. mill in Austria restarted after an outstanding successful rebuild. The goal was to improve product quality and increase production capacity. To this purpose our firm supplied, installed and commissioned five suction cylinders and seven formers including white water circuit and vacuum system, together with a new press. So far, five presses have been installed by the group, two of them in M.M.F. mill. Thanks to the outstanding teamwork and coordination among all the companies involved, this rebuilt was completed in less than 2 weeks. Even the first board produced after start-up showed a significantly improved quality.

УРОК 21

1. Выпишите из словаря следующие слова с транскрипцией и переводом. Запомните их произношение и значение.

Pickup felt (n), adhere (v), contribute (v), tension (n), support (v), wrinkle (v), harm (v), substitute (n), brass (n).

2. Прочитайте ряды однокоренных слов. Переведите их, исходя из значения словообразовательных элементов.

Capable (a), uncapable (a), capability;
harm (v), harm (n), harmful (a);
difficult (a), difficulty (n);
contribute (v), contribution (n);
substitute (n), substitute (v), substitution (n);
feed (v), feed (n), feeder (n).

3. Прочитайте и переведите словосочетания.

Felt handling system, first press nip, closed tri-nip press, well proven NipcoFlex technology, optimum strength properties, top and bottom felted dryer groups, automatic vacuum tail threading system, overall press section design.

4. Переведите предложения, обращая внимание на словосочетания: *with respect to … – относительно, что касается; in order to – чтобы; in terms of – с точки зрения*.

1) Formation indicates the overall uniformity of the sheet with respect to fiber distribution.
2) This roll is used in order to press down loose fibers, make the top surface a little flatter and possibly to put a watermark on the paper.
3) The wire guide roll automatically corrects the movement of the wire in order to keep it properly positioned on the machine.
4) The felt is represented in terms of its contribution to the dewatering of the web.
5) The basic theory of drying can be discussed in terms of a combination of drying rate, temperature and moisture content.
6) The paper may have a very acid or corrosive nature with respect to some metals.

5. Переведите предложения, обращая внимание на выделенные слова.

1) Mechanical pulping involves “ripping” the fiber <u>out of</u> the solid wood structure.
2) The ability of a sheet to hide the printing or the back side <u>is a function</u> <u>of</u> the sheet’s ability to scatter light as it passes through the sheet.

3) Because of great sensibility of paper to the reintroduction of paper into the fiber network, it is important to treat the paper to improve its resistance to water.
4) Both full chemical operations and high yield processes leave the pulp too highly colored to be used in making white paper.
5) Since the web is held tightly against the dryer surface, it is difficult for the water to be evaporated into the air spaces present between the dryer and the web.

6. Переведите предложения, учитывая значения *"it"* (часть II, приложение 2, табл. 13).

1) It is important to start up this paper machine in the shortest period of time.
2) The chemicals may help to disperse the ink and remove it from the fibers.
3) The web sticks to the dryer can until it is dry.
4) It was the new engineer who could start up the production.
5) Most modern mills find it convenient to rebuild their machine without breaking off the production.
6) It is necessary for the chips to be presteamed to heat them or to increase their moisture content.
7) Bleaching not only improves the whiteness or brightness of the pump, it improves the permanence of that whiteness.

7. Переведите предложения, обращая внимание на глагольные формы.

1) If after the grinding chemical pulp fibers were formed into a pad on a screen the dried pad of fibers would not bond together.
2) The horizontal press allows the ponds to be equalized on both sides of the web.
3) Dryer felts are operated as dry as possible to prevent water from the felt to be absorbed by the web.
4) Extracting water at this stage takes about an hour.
5) If calcium is used as the base, the calcium can cause scale in the tanks and pipes must be used to thicken the liquor.
6) The chips flowing from the digester, it may be necessary to introduce steam to complete the blowing of the chips.

8. Прочитайте и переведите текст.

Overall press section design

The web feed through the press section and the combination of types of presses used can be infinite. On slow machines or machines that make heavy or strong paper, the web can be lifted manually from the wire and transferred to the first press felt. On high speed machines or machines making lightweight or weak papers, the web is not capable of being openly drawn. In these cases, the web is lifted from the wire by the use of a pickup felt. When the felt is pressed against the wet web, the web will adhere to the less porous surface and will be drawn with the felt. If difficulty is expected in

removing the web from the wire, a suction quadrant can be installed in the press roll behind the pickup felt. The suction will draw the felt away from the wire and help it to adhere to the felt.

The felt does not only contribute to the dewatering of the web. It also serves as a transporting material to carry the weak web through the press section. The pickup felt therefore delivers the web directly into the first press nip.

The felt is a continuous belt passing through a series of rolls. The felt handling system must be designed to keep the felt under tension, so it can support the paper web and not wrinkle and harm the web.

The solid rolls need to be very smooth surfaced to smooth the surface of the paper. The traditional press roll is made of granite. As machines have increased in width, it has become more difficult and expensive to manufacture press rolls of granite. Substitutes were found: synthetic granite, called stonite. The rolls manufactured of stonite are quite satisfactory, as are brass rolls in some applications.

The web leaving the press section is at about 36% consistency and will need drying.

9. Ответьте на вопросы.

1) What machines allow transferring the web manually from the wire to the press?
2) What machines need a pickup felt in order to draw the web from the wire?
3) What is the function of the felt in the press section?
4) What does the felt represent?
5) Why must the felt be under tension?
6) What is the role of smooth surface of the solid rolls?
7) What material are the rolls made of?

10. Выберите слова близкие по значению из следующего ряда:

To expell, to position, to transfer, to adhere, to locate, to transport, to bond, to squeeze.

11. Переведите текст письменно со словарем.

The press section is a closed tri-nip press using the well proven NipcoFlex technology which provides excellent sheet dryness with optimum strength properties. The closed sheet transfer throughout the press section ensures excellent runability at high operating speeds.

The dryer section consists of 3 groups of dryers with boxes, followed by 4 conventional top and bottom felted dryer groups. A special feature of the dryer section is the exceptional quick threading system for ease of the threading process. The bail transfer from the last dryer to the calender is handled by an automatic vacuum tail threading system.

УРОК 22

1. Правильно прочитайте и вспомните значение слов.

Web (n), consistency (n), remove (v), evaporation (n), till (n), dryer drum (n), dryer can (n), mount (v), row (n), stack (v), roll (n), weave (wove, woven) (v), reach (v), determine (v), moisture (n), content (n), stick (v).

2. Прочитайте ряды однокоренных слов. Переведите их, исходя из значения словообразовательных элементов.

Modify (v), modification (n);
stack (v), stack (n), stacking (n);
weave (v), woven (a);
high (a), height (n);
vapour (n), evaporate (v), evaporated (a).

3. Прочитайте и переведите словосочетания.

Single – roll dryer, box board machine, moisture content, paperboard web, non-stick surface, thermal sprayed coatings, wear and corrosion resistant doctor blades, press rolls, winder rolls, calender rolls.

4. Переведите предложения, учитывая значение слова *only: 1) (a) – единственный (the only); 2) (adv.) – только.*

1) In this case the only solution is to use another fiber collection for making paper.
2) The web of paper can only be raised to about 40% consistency by pressing.
3) Tissue is not the only grade made by the dryer of specific design called Yankee.
4) The only aim of bleaching operations is commonly oriented towards removing color and not impurities.
5) The only one stage bleach received by groundwood and secondary fiber pulps is either hypochlorite or peroxide.
6) Dryer cans are used but only after the coating has been dried enough.
7) The size press coaters are suitable only for lower quality grades of printing papers.

5. Переведите предложения, обращая внимание на выделенные слова.

1) The combined action of the rotation and pumping causes the fibers to follow a spiral route through the refiner.
2) Twin –wire machines must include equipment to control which of the two wires the web will follow.

3) If the web is strong, as it is the case of paperboard manufacture, the pressure can be obtained by different ways.
4) The slice cannot function alone, but must work in conjunction with the headbox.
5) The majority of water is removed in this section by means of table rolls.

6. Переведите предложения, обращая внимание на различные глагольные формы.

1) The penetration of the liquor into the wood seems to be occuring in the most undesirable direction.
2) An off-machine blade coater is designed to apply one coat to both sides.
3) Pressurized head box uses rectifier rolls to generate uniform flow and turbulence to prevent fiber flocculation.
4) The rotation of the siphon does an excellent job of maintaining a uniform condensate film thickness thereby controlling the dryer temperature.

7. Прочитайте и переведите текст.

Drying the web (I)

The web of paper can only be raised to about 36 % to 40 % consistency by pressing; the rest of the water in the sheet must be removed by evaporation. The conventional method for evaporating the water was to pass the wet web around steam-filled cylinders, which heat the web to the vaporization temperature of the water so that the water will evaporate. The cylinders are called dryer drums or cans. They are normally about 4 or 5ft in diameter and as wide as the machine.

The dryer cans are mounted in two horizontal rows such that the web can be wrapped around one in the top row and then one in the bottom row. The web travels back and forth between the two rows of dryers until it is dry. There are two notable exceptions to the use of two rows. One exception is the use of one roll about 12 to 15ft in diameter, which dries the web in one pass. This single-roll dryer is called a yankee dryer, and is used to dry light weight paper such a tissue. A second modification of the two rows of dryers is the use of vertical stacking in boxboard or cylinder machines. In the boxboard machine, the number of dryers needed is so great that the rolls are frequently stacked one above another, with the paperboard web weaving back and forth between the two stacks until it reaches a height of about 10 dryer cans.

The web will go up and down perhaps a dozen stacks of dryers before it is dry. The number of dryer cans needed in any machine is determined by the basis weight of the paper, its moisture content coming into the dryer section and the speed at which the machine is to be run.

8. Ответьте на вопросы

1) What consistency does the paper leave the press section at?
2) What is the conventional method of evaporating the rest of the water from the web?
3) How are the dryer cans mounted?
4) When are single-roll dryers used?
5) When is vertical stacking used?
6) What is the number of dryers determined by?

9. Переведите следующие словосочетания.

Поднять концентрацию до 36 %, удалить с помощью испарения, двигаться взад и вперед, один за другим, плотность бумаги.

10. Переведите текст письменно со словарем.

For years, Teflon sleeves have been used to provide a non-stick surface to dryer cans. Disadvantages of the sleeves are the inability to doctor these surfaces and the high risk towards accidental damage.

Ultra-hard carbide, ceramic and metal based thermal sprayed coatings are widely used to provide extreme wear and corrosion resistant surfaces on press rolls, calender rolls, Yankee dryers, winder rolls and doctor blades.

Endure Clean coating combines wear/corrosion resistant and non-stick properties in one unique system. It will protect the surface, prevents sticking and thus improves the performance of the dryer or roll for years to come. The system has found wide acceptance in paper machines as numerous dryers and rolls have been coated on site since its introduction.

УРОК 23

1. Выпишите из словаря следующие слова с транскрипцией и переводом. Запомните их произношение и значение.

Face (n), intermeshing gear (n), chain (n), steam joint (n), attach (v), saturated (a), valuable (a), major (a), surface (n), push (v), pull (v), thread (n), hollow (a), head (n).

2. Прочитайте ряды однокоренных слов. Переведите их, исходя из значения словообразовательных элементов.

Heat (n), heat (v), heating (a), heated (a);
value (n), valuable (a), evaluation (n);
require (v), requirement (n);
achieve (v), achieving (a), achieved (a);
obtain (v), obtaining (a), obtained (a);
conduct (v), conducting (a), conducted (a), conduction (n);
head (n), headbox (n).

3. Прочитайте и переведите словосочетания.

Paperboard manufacture, heat transfer, flow rate winder reel, downward flow, kraft cook, emission level.

4. Переведите предложения, обращая внимание на наречия.

1) Every machine has at least two winder reels.
2) Tunnel dryers may have carrier rolls in the tunnel to transport and carry the web through.
3) The web travels back and forth between the two rows of dryers until it is dry.
4) If too much downward flow is allowed, enouph stock will not be drawn out of top.
5) If a very strong or complete kraft cook is desired, the time may be as long as 8 hr.

5. Переведите предложения, обращая внимание на подчеркнутые слова.

1) The pressure of the web causes the surface of the paper to be compressed.
2) All the finishing techniques give additional variability and choice to both manufacturer and purchaser of coated grades.
3) The two functions of a dryer can are satisfied by the use of a steam joint.
4) In order to reach a large enough emission level the amount of heat transferred by radiation is small.

5) The sheet of paper was pressed between felts and either hung or placed on a smooth surface to dry.
6) In order for both sides to be coated in this manner the web must be fed first in one horizontal direction and then in the other.

6. Переведите предложения, обращая внимание на глагольные формы.

1) Any chemicals to be applied to the web are applied in special devices on the calender stack.
2) Longer fibers are more lively to clump together in the headbox on the paper machine and cause wild formation.
3) The headbox uses long thin sections to control flow rates and generate turbulence to control flocculation.
4) By controlling the thickness and flow rate of stock on the wire while keeping the consistency of the stock constant the weight of the web is controlled.
5) At 25 % consistency the forces holding the web have been shown to be hydrogen bonding between fibers.

7. Прочитайте и переведите текст.

Drying the web (II)

The dryer can is a hollow cylinder of about 4 to 5ft in diameter, with a face width slightly greater than the width of the paper. All dryer cans are driven, either with intermeshing gears on the ends of the dryers or by gears and chains that drive the cans at the same speed. The dryers can is heated with steam, so the steam must be introduced into the can and condensate removed. The two functions are satisfied by the use of a steam joint. The steam joint needs to be non-rotating so that pipes that feed the steam and remove the condensate can be attached to it.

Saturated steam should be used so that the latent heat of vaporization of water can be obtained and used to heat the web. If saturated steam is used, it must first be cooled to the condensation temperature. The heat obtained by the cooling of the steam is valuable but the heat that can be obtained from the condensation of steam is much more valuable.

The major means for heat transfer to the web is conduction from the hot dryer surface to the paper web. Conductor requires contact, and contact is not easy to achieve with paper, because its surface is rough. Contact can be improved by pushing the web against the surface of the dryer. If the web is strong, as it is the case of paperboard manufacture, the pressure can be obtained by placing more tension on the web and pulling it up tightly against the dryer surface. With lightweight paper, we need the help of the dryer felt. The dryer felt needs to have an open structure to allow the evaporating water to pass through but it does not need the smooth porous surface required for a press felt. The press felts were operated moist to aid in the absorption of water. Dryer felt are operated as dry as possible to prevent water from the felt being absorbed by the web. Most felts now used are woven from plastic threads

which allow a very open structure with very little tendency to absorb water. The dryer felt therefore functions to hold the web tightly against the surface of the dryer to improve heat transfer and to prevent wrinkling of the paper as it dries.

8. Ответьте на вопросы.

1) What does a dryer can represent?
2) How are the dryer cans driven?
3) What device ensures introduction of the steam and removal of the condensate?
4) What kind of steam should be used in the dryer can?
5) What is the major means for heat transfer from the dryer surface to the web?
6) How is the contact between the dryer surface and the paper achieved?
7) What are dryer felts manufactured from?

9. Переведите следующие словосочетания.

Производство картона, оказывать давление на полотно, как можно более сухой, плетеный из синтетических нитей, тенденция поглощать воду, предупреждать сморщивание бумаги.

10. Переведите текст письменно со словарем.

The slice is intended to control the flow of stock onto the wire. It cannot function alone, however, but must work in conjunction with the headbox. If we want to increase the flow rate from the head box we can either increase the head (the height of liquid) in the box or make the slice smaller. Since the size of the slice opening also affect the basis weight of the web, we normally increase flow rate by increasing the head of the head box. This solution to the problem has been used and is acceptable for speeds up to perhaps 700 f p.m. The head box can be pressurized to create the desired pressure of head without having a large volume of stock in the box.

УРОК 24

1. Выпишите из словаря следующие слова с транскрипцией и переводом. Запомните их произношение и значение.

Loading cylinder (n), subject (v), stack (n), respond (v), expand (v), water box (n), gloss (n), middle (n), breaker stack (n).

2. Прочитайте ряды однокоренных слов. Переведите их, исходя из значения словообразовательных элементов.

Act (v), action (n), activity (n), counteract (v);
depend (v);
dependence (n), depending on;
expand (v), expansion (n);
break (v), breaker stack, breaking, broken.

3. Прочитайте и переведите словосочетания.

Steel roll, calender stack, bottom roll, machine direction, excess white water

4. Переведите предложения, учитывая значение выделенных слов.

1) As the web passes between the rolls, the filled roll deflects causing a slight slipping in the nip.
2) The flow of the cylinder machine is complicated since there are several forming devices operating at the same time.
3) The roll coater has been used for publication grades, but because of its limited speed is now not too widely used.
4) In spite of their popularity it is difficult to demonstrate a clear advantage of twin-wire formers for printing grades of paper.
5) It is easy to describe the operation of the fourdrinier machine in terms of how the paper web travels through it while it is running.
6) The burning of the thickened liquor takes place under both oxidizing and reducing atmospheres.

5. Переведите предложения, обращая внимание на глагольные формы.

1) This method of grinding is most efficient in removing whole logs and reducing waste.
2) Refining that leads to fibrillation is seen to have mixed effects on the paper, some properties will be improved but optical properties will suffer.
3) Heating the chips and the inside of the digester is one of the important functions of presteaming operations.

4) The water is likely to be drawn in both directions at the same time, since both surfaces should be hotter than the center of the web.
5) The rotary drum washer is designed such that the stock to be washed is introduced into the tank under the washing drum.
6) Washing is necessary to remove the impurities but the pulp still requires further bleaching to make it white.
7) Additives are added to enhance the printing surface of the paper.
8) Groundwood pulp has too much lignin in it to be subjected to chlorination and extraction.

6. Переведите предложения, обращая внимание на местоимения в роли словозаменителей.

1) Small particles have a high probability of passing through the screen and large ones have decreasing probabilities as their size increases.
2) The press section serves a second function besides the removal of water, that of consolidation of the web.
3) The amount of heat energy from cooling the steam is very small compared with that obtained from the condensation of the steam.
4) Cutting may not always be the most desirable form of fiber treatment, but it is the one most directly observed in the paper treatment.
5) The pressure that develops in the digester may become greater than that which would be associated with the temperature due only to steam pressure.
6) Since the paper mast be dried in one pass around the dryer, it is necessary to supply additional energy above that provided by the dryer can.

7. Прочитайте и переведите текст.

Calendering

The machine calender is a stack of steel rolls at the dry end of the paper machine through which the web is passed. The steel rolls press the web either through their own weight or through the use of loading cylinders. The pressure on the web causes the surface to be compressed, producing a flatter surface. The calender stack will also reduce the thickness of the paper.

The steel rolls at the bottom of the stack of calenders tend to bend due to the weight of the rolls and the pressure used. If these rolls do bend, the web is subjected to more pressure at the edges that at the center. The center will therefore be rougher and not reduced in thickness as much. To counteract the tendency of the bottom rolls to bend, they are made larger in diameter than the other rolls.

Another problem associated with the calender is the development of streaks in the web. If the web comes to the calender stack with either wet streaks or streaks in the machine direction, the rolls in the stack respond by heating more or less, depending on the web conditions. The diameter of the rolls in the stack will expand due to the heat generation and may expand enough to create increased pressure in the

hot areas. Therefore there must be a device for controlling the temperature of the rolls in the stack.

In the boxboard machine liquid solution can be applied to the surface of the web by the water boxes. The development of smoothness and gloss in the calender is sensitive to the moisture content of the web pas-

sing through the stack. The higher the moisture, the higher the gloss. However, the web is normally dry when it reaches the stack.

Some machines have more than one stack of calendars. A stack is sometimes installed in the middle of a dryer section or just before a size press to press the paper before it is completely dry, or before the size application to keep the size on the surface. These stacks are referred to as breaker stacks because they break the dryer section into smaller sections.

8. Ответьте на вопросы.

1) What does the machine calender represent?
2) How do the cylinders press the web?
3) What is the aim of calendering?
4) How is the tendency of the bottom rolls to bend counteracted?
5) How is the development of streaks on the web counteracted?
6) What device is used in order to apply liquid on the web?
7) What is a breaker stack?

9. Переведите следующие словосочетания.

С помощью пневматических цилиндров уменьшить толщину бумаги, подвергать полотно давлению, полосы в направлении движения машины, мягкость и блеск бумаги, разбивной двухвальный каландр.

10. Переведите текст письменно со словарем.

Since the stock coming to the wet end is at a higher consistency than the web, leaving it, we have a net gain of water in this part of the machine. This net gain of 44,15 tons of excess whitewater also contains 0,05 ton of fibers. This may not sound like much, but since it is only based on 1 ton of fibers it must be seen as a loss of 5%. It is therefore necessary for the mill either to send this flow to a device, which will reclaim the fibers and clean water for reuse or use this water for other dilutions where the fibers will not be lost. The latter is the cheapest and easiest way to reclaim the water and fibers, but there may be chemical concentrations in the whitewater that will not allow to use it.

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