МИНИСТЕРСТВО ОБРАЗОВАНИЯ РЕСПУБЛИКИ БЕЛАРУСЬ

Белорусский национальный технический университет

Кафедра «Иностранные языки»

О. В. Веремейчик
Е. Б. Якимович

PACKAGING. HISTORY. PACKAGING MATERIALS. BIONIC DESIGN

УПАКОВОЧНОЕ ПРОИЗВОДСТВО. ИСТОРИЯ. УПАКОВОЧНЫЕ МАТЕРИАЛЫ. БИОНИЧЕСКИЙ ДИЗАЙН

Учебно-методическое пособие

Минск
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Учебно-методическое пособие
для студентов технических вузов
специальности 1-36 20 02 «Упаковочное производство»

Рекомендовано учебно-методическим объединением в сфере высшего образования Республики Беларусь по образованию в области машиностроительного оборудования и технологий

Минск
БНТУ
2014

УДК 811.111:621.798 (075.8)
ББК 81.2 Англ я7
В31

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В31 Packaging. History. Packaging Materials. Bionic Design=Упаковочное производство. История. Упаковочные материалы. Бионический дизайн : учебно-методическое пособие для студентов технических вузов специальности 1-36 20 02 «Упаковочное производство» / О. В. Веремейчик, Е. Б. Якимович. – Минск : БНТУ, 2014. – 54 с.

ISBN 978-985-550-225-9.

Пособие содержит аутентичные тексты, тематически связанные с вопросами истории упаковочного производства, типов упаковочных материалов, авангардных технологий конструирования промышленных изделий. Представленные в пособии задания, ориентированы на освоение профессиональной лексики, контроль понимания содержания прочитанного, развитие навыков разговорной речи и активное использование профессиональной лексики в предметной области.

Предназначено для студентов специальности «Упаковочное производство» дневной и заочной форм получения образования, а также для широкого круга лиц, самостоятельно изучающих английский язык.

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CONTENTS

ВВЕДЕНИЕ

Упаковочное производство – важный и динамично развивающийся бизнес-сектор. Компаниями производится и используется необозримое количество различных типов, видов и конструкций упаковки. Природа упаковки такова, что она связана почти со всеми типами промышленности. Она является неотделимой частью еды и напитков, предметов личной гигиены, фармацевтики, электроники, химической промышленности и т.д. Упаковка играет многоплановую роль, которая сегодня становится все более значимой для мирового рынка.

Пособие «Packaging. History. Packaging materials. Bionic design (Упаковочное производство. История. Упаковочные материалы. Бионический дизайн)» имеет своей целью оказание помощи студентам специальности «Упаковочное производство» в приобретении, развитии навыков чтения и понимания аутентичных текстов с выходом в устную речь.

Пособие состоит из трех частей. Первая часть включает аутентичные тексты, содержание которых раскрывает историю создания упаковочных материалов. Каждый текст снабжен кратким словарем и последующими упражнениями, целью которых является освоение лексики данного текста, контроль понимания содержания прочитанного, развитие навыков разговорной речи.

Во второй части пособия представлены тексты, содержащие информацию об основных технологических качествах различных видов упаковки. Тексты сопровождаются иллюстрированными примерами использования конкретного упаковочного материала. Они помогают студентам не только овладеть основной терминологией в сфере упаковочного производства, но и познакомиться с некоторыми достижениями в области упаковочных материалов.

Третья часть пособия содержит оригинальные примеры бионического дизайна в области архитектурного строительства. Описываются авангардные технологии конструирования промышленных изделий.

В каждую часть пособия включены творческие задания, направленные на развитие у студентов умения работать в команде, осуществлять самопрезентацию, аргументировано излагать свою точку

зрения, что, в свою очередь, способствует развитию речи, структурности и самостоятельности мышления, умения обобщать и систематизировать информацию, делать соответствующие выводы, осуществлять рефлексию на иностранном языке.

Данное пособие рекомендовано лицам, которые уже имеют определенный запас общеупотребительной лексики в сфере упаковки. Пособие предназначено для студентов всех технических специальностей дневной и заочной форм получения образования, а также для широкого круга лиц, профессиональная деятельность которых связана с упаковочным производством на английском языке.

Авторы

Part 1. The History of Packaging

TEXT 1. Rudimentary Forms of Packaging

Packaging as we know it today is the result of a long development process. It is the product of continuous research aimed at finding better methods of packaging the various goods we use, including our food, in order to ensure the best protection for them.

In early days, food was consumed where it was found. Families and villages were self-sufficient, making and catching what they used. When containers were needed, nature provided gourds, shells, and leaves to use. Later, containers were fashioned from natural materials, such as hollowed logs, woven grasses and animal organs.

Fabrics descended from furs used as primitive clothing. Fibers were matted into felts by plaiting or weaving. These fabrics were made into garments, used to wrap products or formed into bags. With the weaving process, grasses, and later reeds, were made into baskets to store food surpluses. But it is now clear that these first forms of packaging were very rudimentary, and not always hygienic.

As ores and compounds were discovered, metals and pottery were developed, leading to other packaging forms. A brief description of the most popular packaging developments is given below.

rudimentary [ˌru:di'mentəri] – элементарный, зачаточный, рудиментарный
gourd – тыква, бутыль из тыквы
hollowed – выдолбленный, полый
woven – тканый, плетенный
fabric – ткань
descend – происходить
fiber – волокно, нить
matt – валять, сбивать в войлок
felt – войлок
plait – плести
weave – ткать
garment – предмет одежды, (pl.) одежда
wrap – завертывать, сворачивать, складывать

reed – тростник, камыш; тростниковые заросли; солома для крыш
surplus – излишек, остаток
hygienic – гигиенический; здоровый
ore – руда
pottery – гончарные изделия, керамика

EXERCISES

I. Match the words from the text with their corresponding definitions.

1. hollowed	a) an amount of something that is more than what is needed or used
2. woven	b) clean and likely to prevent bacteria, infections, or disease from spreading
3. fabric	c) rock or earth from which metal can be obtained
4. descend	d) to make cloth, a carpet, a basket etc by crossing threads or thin pieces under and over each other by hand or on a loom
5. fiber	e) objects made out of baked clay; clay that has been shaped and baked in order to make pots, dishes etc
6. surplus	f) very simple and basic, not advanced
7. rudimentary	g) empty inside having an empty space inside
8. pottery	h) a mass of threads used to make rope, cloth etc.
9. ore	i) cloth used for making clothes, curtains etc
10. hygienic	j) to have developed from something that existed in the past

II. Read the definitions. Then supply the missing vowels to each word.

1. to twist three long pieces of hair or rope over and under each other to make one long piece	p l_ _ t
2. to make cloth, a carpet, a basket etc by crossing threads or thin pieces under and over each other by hand or on a loom	w_ _ v _
3. to pack or interweave into a thick mass	m _ _ t
4. to put paper or cloth over something to cover it	w r _ p
5. to press or mat (something) together	f _ l t

III. Find 9 natural materials used for packaging in ancient times. They are hidden in the grid horizontally and vertically.

X	Y	Z	R	O	S	L	O	G	S	W	E
A	N	I	M	A	L	O	R	G	A	N	S
W	E	A	K	I	D	A	E	O	O	K	H
L	E	A	V	E	S	O	S	U	T	Z	E
Z	Y	S	T	U	V	F	U	R	S	W	L
O	R	S	T	Y	R	E	E	D	S	E	L
T	U	V	A	G	R	A	S	S	E	S	S

IV. Fill in the gaps using the reference words.

Reference words: *fabric, fibers, hollowed, hygienic, leaves, ore, plaiting, pottery, reed, rudimentary, shells, surpluses, wrap, weaved.*

Note: made from something is used when the ingredient or ingredients are not immediately obvious:

eg. Beer is made from hops (хмель).

Paper is made from wood.

made (out) of something is used when we can actually recognize the materials:

eg. A shirt made of silk

This table is made of wood

1. It's a present for my mother. Could you … it?
2. This ornament is made of … and … .
3. We can use these pipes for building. They are … .
4. … baskets from … is very popular in this village.
5. … is very expensive nowadays.
6. The first forms of packaging were very …, and not always … .
7. Our … contains natural … .
8. … of products should be stored in a refrigerator.
9. This factory manufactures … .
10. The … is used for steel production.

TEXT 2. Paper and Paper Products

Paper may be the oldest form of what today is referred to as «flexible packaging». Sheets of treated mulberry bark were used by the Chinese to wrap foods as early as the First or Second century B.C. During the next fifteen hundred years, the paper-making technique was refined and transported to the Middle East, then Europe and finally into the United Kingdom in 1310. Eventually, the technique arrived in America in Germantown, Pennsylvania, in 1690.

But those first papers were somewhat different from those used today. Early paper was made from flax fibers and later old linen rags. It wasn't until 1867 that paper originating from wood pulp was developed.

Although commercial paper bags were first manufactured in England, in 1844, Francis Wolle invented the bag-making machine in 1852 in the United States. Further advancements during the 1870s included glued paper sacks and the gusset design. After the turn of the century (1905), the machinery was invented to automatically produce in-line printed paper bags.

With the development of the glued paper sack, the more expensive cotton flour sacks could be replaced. But a sturdier multiwalled paper sack for larger quantities could not replace cloth until 1925 when a means of sewing the ends was finally invented.

The first commercial cardboard box was produced in England in 1817, a simple yet revolutionary invention. Corrugated paper appeared in the 1850s; shipping cartons of faced corrugated paperboard began to replace self-made wooden crates and boxes used for trade.

As with many innovations, the development of the carton was accidental. Robert Gair was a Brooklyn printer and paper-bag maker during the 1870s. While he was printing an order of seed bags, a metal rule normally used to crease bags shifted in position and cut the bag. Gair concluded that cutting and creasing paperboard in one operation would have advantages; the first automatically made carton, now referred to as «semi-flexible packaging», was created. This made the transportation of goods much easier and the box became the most widely used method of packaging at the beginning of the century due to its very low price and ease of use.

The development of flaked cereals advanced the use of paperboard cartons. The Kellogg brothers were first to use cereal cartons at their

Battle Creek, Michigan, Sanatorium. When this «health food» of the past was later marketed to the masses, a waxed, heat sealed bag of Waxtite was wrapped around the outside of a plain box. The outer wrapper was printed with the brand name and advertising copy. Today, of course, the plastic liner protects cereals and other products within the printed carton. Paper and paperboard packaging increased in popularity in the 20th century. Then with the advent of plastics as a significant player in packaging (late 1970s and early 1980s), paper and its related products tended to fade in use. Lately that trend has halted as designers try to respond to environmental concerns. Nowadays, boxes are used to supply us with fragile and high-tech equipment, such as video recorders and computers.

flexible packaging – гибкая упаковка
sheets of treated mulberry bark – листы обработанной коры шелковицы
refine – усовершенствовать
flax – лен
linen – льняной, полотняный
rag – лоскут
pulp – древесная масса, мякоть
sack – мешок, куль
gusset – угловое соединение, ластовица
sturdy – крепкий, прочный
a multiwalled paper sack – многослойный бумажный мешок
cardboard – картон
corrugated – гофрированныйб рифленый
corrugated paperboard – гофрокартон
shipping cartons of faced corrugated paperboard – транспортная упаковка из гофрированного картона
crease – загибать
semiflexible packaging – полугибкая упаковка
flaked cereals – зерновые хлопья
wax – воск
heat sealed bag – герметичный пакет
outer wrapper – внешняя оболочка, обертка
halt – остановить
fragile – хрупкий, непрочный, ломкий

EXERCISES

I. Match the words from the text with their corresponding definitions.

1. refine	a) to stop moving, to prevent someone or something from continuing
2. advancement	b) to use a needle and thread to make or repair clothes or to fasten something such as a button to them
3. sturdy	c) to become marked with a line or lines, or to make a line appear on cloth, paper etc. by folding or crushing it
4. crease	d) strong, well-made, and not easily broken
5. sew	e) progress or development in your job, level of knowledge etc.
6. cut	f) to improve a method, plan, system etc by gradually making slight changes to it
7. halt	g) to reduce the amount of something

II. Read the definitions. Then supply the missing vowels to each word.

1. something, somebody can change or be changed easily to suit any new situation	f l _ x _ b l _
2. in the shape of waves or folds, or made like this in order to give something strength	c _ r r _g _t _ d
3. stiff thick brown paper, used especially for making boxes	c _ r d b _ _r d
4. cloth made from the flax plant, used to make high quality clothes, home decorations etc.	l _ n _n
5. a sticky substance used for joining things together	g l _ _
6. a piece of material that is stitched into a piece of clothing to make it stronger, wider, or more comfortable in a particular place	g _ s s _ t

III. Find 4 types of containers made of paper mentioned in the text. They are hidden in the grid horizontally and vertically.

B	S	A	C	K
A	E	G	R	W
G	B	l	A	T
I	O	P	T	Y
V	X	Q	E	Z

IV. Put the given words into the right order to make 8 phrases taken from the text. Consult the text.

bag	gusset	paper
bags	heat	printed
concerns	inline	rags,
design	linen	sack
environmental	multiwalled	sacks
fibers	old	sealed
flax	paper	waxed
glued	paper	

V. Combine a verb on the left with a preposition on the right. Consult the text.

1. to be different	a) with
2. to be made	b) to
3. to increase	c) to
4. to tend	d) in
5. to respond	e) from
6. to supply	f) from

TEXT 3. Glass

Although glass-making began in 7000 B.C. as an offshoot of pottery, it was first industrialized in Egypt in 1500 B.C. Made from base materials (limestone, soda, sand and silica), which were in plentiful supply, all ingredients were simply melted together and molded while hot. Since that early discovery, the mixing process and the ingredients have changed very little, but the molding techniques have progressed dramatically.

At first, ropes of molten glass were coiled into shapes and fused together. By 1200 B.C., glass was pressed into molds to make cups and bowls. When the blowpipe was invented by the Phoenicians in 300 B.C., it not only speeded production but allowed for round containers. Colors were available from the beginning, but clear, transparent glass was not discovered until the start of the Christian Era. During the next 1000 years, the process spread steadily, but slowly, across Europe.

Despite its fragility and high production costs, glass had an advantage over cans: glass is chemically inert. In a metal can, iron, tin, and even lead may interact with the water of the preserved food due to chemical or galvanic reactions (although that problem had been solved when iron was replaced by lighter material). The problem of lead contamination had been removed in 1904 when the production system of the Sanitary Can Company in New York made soldering of the can unnecessary.

The split mold developed in the 17th and 18th centuries further provided for irregular shapes and raised decorations. The identification of the maker and the product name could then be molded into the glass container as it was manufactured. As techniques were further refined in the 18th and 19th centuries, prices of glass containers continued to decrease. One development that enhanced the process was the first automatic rotary bottle-making machine, patented in 1889. Current equipment automatically produces 20,000 bottles per day.

Glass became a relatively cheap and convenient form of packaging in 1903 when Michael J. Owen in Britain invented a semiautomatic machine for producing both jars and bottles. In the nineteenth century a major problem with glass containers had been finding a way to close a relatively expensive container without making the bottle or jar useless after it had been opened. Glass bottles could be closed with a cork, but closing bottles and jars that had wide mouths remained a problem.

Numerous ingenious inventions and innovations sought convenient ways to open and close glass containers (and cans as well). The breakthrough came with the invention of the zinc cap for the shoulder-seal jar. The most significant inventions were the Mason Jar in 1858 (named for its inventor, John Landis Mason), a glass jar with a thread at the neck that could be closed by screwing on a metal cap, and the Crown Cap for bottles, invented by William Painter in 1898.

In rural households in Europe from the 1890s until about the 1950s, food preservation in jars of glass and bottles by means of Appert tech-

niques was common, and small portable canning machines made it possible to use the new food preservation techniques in the 1930s and 1940s.

While other packaging products, such as metals and plastics, were gaining popularity in the 1970s, packaging in glass tended to be reserved for high-value products. As a type of «rigid packaging», glass has many uses today.

offshoot – ответвление
limestone ['laimstəun] – известняк
mold=mould – отливать форму, формовать
mold=mould – лекало, шаблон, матрица
molten – расплавленный
coil – свертываться кольцом, спиралью
fuse – плавить(ся), сплавлять
blowpipe – стеклодувная трубка
transparent – прозрачный
fragility – хрупкость, ломкость
can – жестяная банка
inert [i'nə:t] – инертный, неактивный; нейтральный
tin – олово
lead – свинец
lead contamination – загрязнение свинцом
soldering – паяние, пайка легкоплавким припоем
split – расщепленный, расколотый; раздробленный; разделенный пополам
enhance [in'hɑ:ns] – увеличивать, усиливать
automatic rotary bottle-making machine – автоматически вращающаяся машина для производства бутылок
jar – кувшин
cork [kɔ:k]– пробка
mouth – горлышко (бутылки)
ingenious – изобретательный, искусный
seek (sought) – искать, разыскивать
breakthrough – прорыв, достижение, открытие
zinc cap for the shoulder-seal jar – цинковый колпачок для кувшина (банки) с горловиной

the Mason jar (trademark) – a glass pot with a tight lid, used for preserving fruit and vegetables
a glass jar with a thread at the neck that could be closed by screwing on a metal cap – стеклянная банка с резьбой на горлышке, которая могла быть закрыта ввинчиванием металлического колпачка
rigid packaging – жесткая упаковка, тара

EXERCISES

I. Match the words from the text with their corresponding definitions.

1. mold	a) to make a place or substance dirty or harmful by putting something such as chemicals or poison in it
2. coil	b) to join together physically, or to make things join together, and become a single thing
3. fuse	c) to wind or twist into a series of rings, or to make something do this
4. inert	d) a glass container with a wide top and a lid, used for storing food
5. breakthrough	e) a long round thing which is put into the top of a bottle, especially a wine bottle, to keep liquid inside
6. contaminate	f) to shape a soft substance by pressing or rolling it
7. cork	g) an important new discovery in something you are studying, especially one made after trying for a long time
8. jar	i) not producing a chemical reaction when combined with other substances

II. Read the definitions. Then supply the missing vowels to each word.

1. can be seen through	t r _ n s p _ r _ n t
2. easily broken or damaged	f r _ g _ l _
3. a plan, idea, or object which works well and is the result of clever thinking and new ideas	_ n g _ n _ _ _ s
4. the open part at the top of a bottle or container	m _ _ t h
5. a type of rock that contains calcium	l _ m _ s t _ n _

III. Find 4 base materials for glass making and 4 verbs which describe this process. They are mentioned in the text. They are hidden in the grid horizontally and vertically.

S	C	Z	P	F	U	S	E	W
I	O	Y	R	D	A	M	K	U
L	I	M	E	S	T	O	N	E
I	L	P	S	O	J	L	P	Q
C	U	E	S	D	R	D	J	S
A	Z	X	S	A	N	D	O	Z

IV. Speak about the following:

- Advantages of glass over cans.
- The invention of the Mason Jar.

TEXT 4. Metals

Ancient boxes and cups, made from silver and gold, were much too valuable for common use. Other metals, stronger alloys, thinner gauges and coatings were eventually developed.

The process of tin plating was discovered in Bohemia in 1200 A.D. and cans of iron, coated with tin, were known in Bavaria as early as the 14th century. However, the plating process was a closely guarded secret until the 1600s. Thanks to the Duke of Saxony, who stole the technique, it progressed across Europe to France and the United Kingdom by the early 19th century. After William Underwood transferred the process to the United States via Boston, steel replaced iron, which improved both output and quality.

In 1764, London tobacconists began selling snuff in metal canisters, another type of today's «rigid packaging». But no one was willing to use metal for food since it was considered poisonous.

The safe preservation of foods in metal containers was finally realized in France in the early 1800s. Napoléon Bonaparte needed to provide the military with a safe food supply. (The requirements of providing adequate food supplies for armies and navies have been of great significance in the history of modern packaging and food preservation). After fourteen years of experimentation, Nicholas Appert, a Parisian chef and

confectioner, developed a method for preserving foods by heating. The food, meat, or vegetables, was first cooked in open kettles and placed in glass jars. After removing as much air as possible, the jars were carefully sealed with corks wired in place and then submersed in boiling water.

Appert chose glass for the container because he believed that it was air that caused the spoilage. Glass is a material least penetrated by air. It is of importance to note that, in Appert's time, it was not known that microorganisms caused food to spoil. The processes involved in food spoilage were not understood until the second half of the nineteenth century as a result of the work of scientists such as Louis Pasteur (1822–1895) on microorganisms.

In 1810 Appert published his prize-winning essay on food preservation and the French emperor Napoléon awarded the 12,000-franc prize to him. Within a year, an English version appeared in London, and the new method of preserving food in glass spread quickly to other countries.

Two individuals in England are given credit for applying and improving Appert's invention, Bryan Donkin and Peter Durand. Bryan Donkin, an associate of John Hall's at his Dartford Iron Works, realized in 1811 that iron containers could be used instead of the fragile glass, and in 1812 the factory began to produce canned food such as meat. In 1810, Peter Durand patented the use of metal containers, which were easier to make and harder to break than glass jars. (The glass jars used by Appert frequently broke.) He covered iron cans, which were prone to rust, with a thin plating of tin (which is not adversely affected by water), and invented the «tin can». The can represented the birth of a long-term preservation method for food. Canned food was first put to the test by the army during the Crimean wars and during the American Civil War before it became available to consumers.

By 1819 canning had arrived in the United States, but no one wanted canned food until the Civil War started. In 1821, the William Underwood Company in Boston introduced commercial canning in the United States. For a long time, people regarded canned foods with suspicion, and for good reasons. In the middle of the nineteenth century, the foods produced by the canning industry were as likely to spoil as not because of inadequate heating techniques. Then, beginning in 1868, first in the United States and later in Europe, handmade cans were replaced by machine-cut types. The new technology made it possible for giant meat-canning firms like P. D. Armour to emerge in Chicago and Cincinnati.

The product, however, was packed in big, thick, clumsy red cans and was not very appetizing.

Since food was now safe within metal packaging, other products were made available in metal boxes. In the 1830s, cookies and matches were sold in tins.

The American Gail Borden was a pioneer in food canning. In 1856 he successfully produced sweetened condensed milk in cans and was granted a patent on the process. With financial support, the New York Condensed Milk Company was established in 1857. The demand for condensed milk was at first limited, but during the American Civil War (1861–1865) it was introduced on a large scale. The Civil War contributed significantly to the popularization of canned foods in general. The army had to be fed and the government contracted with firms to supply food. Under difficult circumstances, people learned that canned foods such as condensed milk can be tasty and nourishing.

The first cans produced were soldered by hand, leaving a 1 1/2-inch hole in the top to force in the food. A patch was then soldered in place but a small air hole remained during the cooking process. Another small drop of solder then closed the air hole. At this rate, only 60 cans per day could be manufactured.

In 1868, interior enamels for cans were developed, but double seam closures using a sealing compound were not available until 1888.

Aluminum particles were first extracted from bauxite ore in 1825 at the high price of $545 per pound. Although commercial foils entered the market in 1910, the first aluminum foil containers were designed in the early 1950s while the aluminum can appeared in 1959.

For many years, however, the flavor of most canned food left much to be desired. On the other hand, it should be realized that products such as canned peas and salmon were usually sold to people living on the American prairies or in the urban slums in Great Britain, most of whom had never eaten the fresh product. In addition, losses due to spoilage caused by microorganisms remained high.

In the early twentieth century, the heavy cans were replaced by those made of lighter materials, and manufacturers could stress that their products were hygienically processed and, therefore, safer to eat than the traditionally unpackaged products that had been sold in bulk. As food technology advanced, numerous chemical additives were developed to con-

trol or speed up food processing and to increase the keeping quality of canned foods.

Originally, the nutritional value of food preserved by canning was not high, mainly due to the length of time required by the heating techniques. From the 1920s onward, however, the nutritional value of canned foods gradually approached that of the fresh product, thanks to modern food technology. Finally, in the 1960s, Reynolds and Alcoa companies succeeded in making all-aluminium cans out of one piece of metal, thereby solving the problem of the weight of the cans; only the lid needed to be attached.

After cans were invented and progressively improved, it was necessary to find a way to open them. Until 1866, a hammer and chisel was the only method. It was then that the key wind metal tear-strip was developed. Nine years later (1875), the can opener was invented. It has remained, for more than 100 years, the most efficient method of retrieving the contents. In the 1950s, the invention of the rip-off closure and the pop-top lid on aluminium cans made them even more convenient, and made can openers unnecessary. For consumers, the choice between fresh or canned food became largely a question of taste, convenience, and preference.

Collapsible, soft metal tubes, today known as «flexible packaging», were first used for artists paints in 1841. Toothpaste was invented in the 1890s and started to appear in collapsible metal tubes. But food products really did not make use of this packaging form until the 1960s. Later, aluminum was changed to plastic for such food items as sandwich pastes, cake and pudding toppings.

alloy ['ælɔi] – сплав
gauge [geidʒ] – сортамент (проводов), стандарт
coating – покрытие
plating ['pleitiŋ] – покрытие металлом; никелировка, золочение, серебрение
tin plating – лужение
canister – жестяная коробка
submerse – [səb'mə:s] – погружать
spoilage – испорченный товар, брак
penetrate – проникать внутрь

canned food – консервы
to be prone to rust – быть склонным к ржавчине
to emerge – появляться
condensed milk – сгущенное молоко
nourishing – питательный
solder – паять, спаять, припой
enamel – [i'næməl] – эмаль, финифть, глазурь
seam – спай, шов
bauxite ore – ['bɔ:ksait] боксит, алюминиевая руда
foil – фольга
slums – трущобы
additives – добавки
chisel – долото
retrieve – извлекать
collapsible – разборный; складной

EXERCISES

I. Match the words on the left with their synonyms on the right.

1. alloy	a) arise
2. spoilage	b) permete
3. penetrate	c) importance
4. significance	d) mixture
5. emerge	e) damage

II. Read the definitions. Then supply the missing vowels to each word.

1. the reddish-brown substance that forms on iron or steel when it gets wet	r _ s t
2. it can be folded so that it uses less space	c _ l l _ p s _ b l _
3. a type of thick sweet milk sold in cans	c _ n d e _ n s _ d m _ l k
4. this kind of food makes you strong and healthy	n _ _ r _ s h _ n g
5. metal sheets that are as thin as paper, used for wrapping food	f _ _ l
6. a line where two pieces of cloth, leather etc have been stitched together	s _ _ m

7. a metal tool with a sharp edge, used to cut wood or stone — c h _ s _ l

III. Chose adjectives from the list to describe the first cans. Add your own adjectives

appetizing, big, clumsy, hygienic, red, tasty, thick

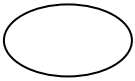
IV. Answer the following questions:

1. Why was the question of food preservation so important in early 1800s?
2. What were the advantages of metal containers?
3. Why did people regard canned food with suspicion?
4. How can you describe the flavor of the first canned food?
5. What were the advantages of aluminium cans?
6. How could the contents of cans be retrieved?

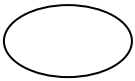
V. Read short descriptions of people who contributed to the development of packaging. Write A–D in the right box.

A – Nicolas Appert
B – Peter Durand
C – Bryan Donkin
D – Gail Borden

	1. He was a British merchant who is widely credited with receiving the first patent for the idea of preserving food using tin cans.
	2. He became a partner in John Hall's firm and had become interested in the problem of canning food in metal containers. After various experiments, he acquired Peter Durand's patent in 1812 for the sum of £1000 and in association with Hall and Gamble he set up a canning factory in Bermondsey, the first cannery to use tinned iron containers.



3. He was a 19th century U.S. inventor, surveyor, and publisher, and was the inventor of condensed milk in 1853.



4. He was the French inventor of airtight food preservation. Being known as the «father of canning», was a confectioner and chef in Paris from 1784 to 1795. In 1795, he began experimenting with ways to preserve foodstuffs, succeeding with soups, vegetables, juices, dairy products, jellies, jams, and syrups. He placed the food in glass jars, sealed them with cork and sealing wax and placed them in boiling water.

TEXT 5. Plastics

Plastic is the youngest in comparison with other packaging materials. Although discovered in the 19th century, most plastics were reserved for military and wartime use.

Styrene was first distilled from a balsam tree in 1831. But the early products were brittle and shattered easily. Germany refined the process in 1933 and by the 1950s foam was available worldwide. Insulation and cushioning materials as well as foam boxes, cups and meat trays for the food industry became popular.

Vinyl chloride, discovered in 1835, provided for the further development of rubber chemistry. For packaging, molded deodorant squeeze bottles were introduced in 1947 and in 1958, heat shrinkable films were developed from blending styrene with synthetic rubber. Today some water and vegetable oil containers are made from vinyl chloride.

Another plastic was invented during the American Civil War. Due to a shortage of ivory, a United States manufacturer of billiard balls offered a $10,000 reward for an ivory substitute. A New York engineer, John Wesley Hyatt, with his brother Isaiah Smith Hyatt, experimented several

years before creating the new material. Patented in 1870, «celluloid» could not be molded, but rather carved and shaped, just like ivory.

Cellulose acetate was first derived from wood pulp in 1900 and developed for photographic uses in 1909. In 1920, the invention of transparent cellophane marked the beginning of the era of plastic.

Although DuPont manufactured cellophane in New York in 1924, it wasn't commercially used for packaging until the late 1950s and early 1960s. It was gradually replaced by the expanding possibilities of polyethylene and other forms of plastic.

In the interim, polyethylene film wraps were reserved for the military. In 1933, films protected submarine telephone cables and later were important for World War II radar cables and drug tablet packaging.

Other cellophanes and transparent films have been refined as outer wrappings that maintain their shape when folded. Being originally clear, such films can now be made opaque, colored or embossed with patterns.

Another breakthrough was the invention of the Tetra Pak in Sweden in 1952, which increased the capabilities of carton containers for packaging milk, fruit drinks, and other liquids. The carton container coated with polyethylene became a serious threat to the market for glass and cans.

The Polyethylene Terephthalate (PETE) container only became available during the last two decades with its use for beverages entering the market in 1977. By 1980, foods and other hot-fill products such as jams could also be packaged in PETE.

The convenience of the microwave was further enhanced in the 1980s with the development of special packaging materials. The demand for ready-to-eat fresh vegetables and fruits stimulated the development of Modified Atmosphere Packaging (MAP).

Current packaging designs are beginning to incorporate recyclable and recycled plastics but the search for reuse functions continues.

A large number of technical innovations led to the continued improvement of packaging and, consequently, to increased choice of food, thus improving our everyday standard of living. In the 1940s, packaging was developed for frozen food. In 1952 the aerosol came onto the market. Cans, available from the 1960s, heralded the explosion of the soft drinks market. Aseptic cartons, invented in 1961, have been used for preserving long-life milk ever since.

This continuous quest by mankind to find new methods of conserving food and transporting products has allowed us to substantially limit the loss of our resources

over the course of time. It has allowed us to move from a society living from one day to the next, dependent on available food sources, to a world which manages its resources in the long term. Efficient packaging, which can be adapted to all kinds of goods, as well as the needs and concerns of people, competition in the marketplace, has made this possible. Modern packaging is what allows us to reheat a frozen meal, as well as to ensure that the Mona Lisa can be sent to the other side of the world and arrive in one piece.

styrene – стирол
distil [dis'til] – извлекать эссенцию, дистиллировать, очищать
brittle – хрупкий
shatter – разбить(ся) вдребезги; раздробить
foam – пена
foam plastic – пенопласт
insulation – изоляция, изоляционный материал
chloride ['klɔ:raid] – хлорид, соль хлористоводородной кислоты
provided for – предусматривать
shrink – сокращать(ся), сморщивать(ся), садиться (о материи), давать усадку
ivory – слоновая кость
carve – резать, вырезать; гравировать; высекать
acetate ['æsitit] – соль уксусной кислоты, ацетат
in the interim – тем временем
opaque [əu'peik] – непрозрачный, светонепроницаемый; темный
emboss [im'bɔs] – выбивать, выдавливать выпуклый рисунок; чеканить; гофрировать
beverage – напиток
incorporate – соединять(ся), объединять(ся); включать (в состав)
recycle – утилизировать, перерабатывать
herald – возвещать, объявлять, предвещать
aseptic – асептический

EXERCISES

I. Match the words on the left with their synonyms on the right.

1. brittle	a) danger
2. shatter	b) absorb
3. opaque	c) break

4. incorporate	d) foggy
5. threat	e) fragile

II. Make all possible derivatives from the given words (nouns, verbs, adjectives, negative forms, etc.).

recycle, use, develop, shrink, innovate, explosion, depend, heat, froze

III. Answer the following questions:

1. What were most plastics reserved for?
2. What products are made from vinyl chloride?
3. Who invented celluloid?
4. What stimulated the development of Modified Atmosphere Packaging?

TEXT 6. Labels and Trademarks

Closely associated with the history of food packaging is the development of food labels and brands. In the first half of the nineteenth century, food manufacturers realized that their products would sell better if a brand name was attached to them, a name with prestige that potential customers could easily recognize.

In the 1660s, imports into England often cheated the public and the phrase «let the buyer beware» became popular. Inferior quality and impure products were disguised and sold to uninformed customers. Honest merchants, unhappy with this deception, began to mark their wares with their identification to alert potential buyers.

Initially, labels with information about the contents were put on glass containers or cans. Official trademarks were pioneered in 1866 by Smith Brothers for their cough drops marketed in large glass jars. This was a new idea - using the package to «brand» a product for the benefit of the consumer.

In 1870, the first registered U.S. trademark was awarded to the Eagle-Arwill Chemical Paint Company. Gradually, the label and the packaging as a whole became a means for promoting the food product.

Today, there are nearly three-quarters of a million (750,000) registered trademarks in the United States alone. Labels now contain a great deal of information intended to protect and instruct the public.

In most industrialized countries, legislation regulates the information that must be provided on packaging for consumers' protection.

Since the beginning of the nineteenth century, food packaging has been closely associated with industrialization and urbanization. Originally, food packaging in glass and cans was primarily meant to preserve food, but convenience became the most significant aspect of food packaging in the twentieth century. The retail revolution, when supermarket chains supplanted family-owned grocery stores, made food packaging an indispensable part of urban food culture. On the other hand, it created problems of waste disposal.

cheate – мошенничать; обманывать
inferior – стоящий ниже
disguise – маскировать, скрывать
alert – тревога, сигнал тревоги
supplant – выжить, вытеснить; занять
indispensable – необходимый

EXERCISES

I. Read the given definitions. What famous labels, brand names and trade marks do you know?

trademark – a special name, sign, or word that is marked on a product to show that it is made by a particular company, that cannot be used by any other company. It is usually registered and protected by law.

label – a piece of paper or another material that is attached to something and gives information about it:

brand name – the name given to a product by the company that makes it. It identifies a group of products sold by the same firm.

logo – is the symbol, design or special way of writing a company uses on its products, notepaper, advertisements, etc. This word is very similar to trademark. However, we would probably prefer the word *logo* when referring to an emblem or purely pictorial presentation.

II. Design a label to go around the outside of the can with your favourite food or drink in it. Don't forget to put the recyclable steel symbol on the label. What ingredients will you include on the label?

ACTIVITIES

- Students could produce a booklet on the different types of containers used to preserve food over the centuries.

- Why do people need to protect and store food? Imagine you are a Roman, Elizabethan or a Victorian citizen. Write a story about what food you buy or gather and how you store it over the winter.

Part 2. Packaging materials

In the second part of the textbook you will read the texts, which contain information about the main characteristics of different types of packaging. The texts are provided with illustrated examples of the use of a particular packaging material.

Packaging is the important and dynamic business sector. The world value of packaging manufacturing exceeds 400 billion Euros per year. The nature of packaging is such that it is intertwined with almost all industries. It is the integral part of food and drink, personal care, pharmaceutical, electronics or chemical industries, to name as just few. The role of packaging is vital to the commercial success of both consumer and industrial products. Packaging industry is distinguished for its diversity and innovative power.

Packaging is a key factor in practically all forms of trade: it is crucial to protect, store and ship goods, and, in many cases, the design of package is the first a customer sees when confronted with any type of product. Consumers react immediately to package shapes, and are influenced by them when making buying decisions. Different product categories are often easy to recognize by their characteristic form, for example chocolate boxes or milk cartons. On the other hand, a manufacture of an exclusive product, such as jewellery or perfume, may deliberately choose an unusual, eye-catching form.

At the same time, packages serve to protect, store and transport goods, and so must be both strong enough to hold their contents and yet efficient in size and shape. Good packaging, therefore, is crucial, both from a logistical and marketing point of view. The packaging ideas featured can’t be created by a designer independently, without recourse to complex manufacturing or engineering processes and materials.

TEXT 1. Paper and Cardboard

The most important packaging supply is the box itself. Cardboard boxes are the most common type of box used for moving and even some storage. They are designed to be strong, lightweight, and disposable. You can find these boxes available at many packaging, shipping or even convenient stores in all sizes. Cardboard boxes are typically inexpensive

so they can be very cost effective when looking to move or store items. In the case of moving, boxes may be damaged and by using cardboard you can easily shrug it off. If you are using cardboard boxes the next important supply is the packaging tape. Whether unfolding and building a new box that has been purchased or reinforcing a box that has been used before, tape is a valuable part of anyone's packaging needs. There are many types of packaging tape for sale. The choice is up to the buyer. The only thing that really matters with tape is how well it's going to hold the box closed. Reinforce the seals on the box as an extra precaution to prevent the contents from spilling out. Papers and boards are available in many variations. For use in retail environment, coated (one side or double-sided) paperboard or card is the material of choice. For wholesale packaging and shipping, a stronger material must be used. The most common material for this purpose is corrugated fibreboard. Although there are many variations available, the most common types are: single-faced corrugated board, which is flexible and can be wrapped around product, and in ascending order of strength and rigidity single-, double-, and triple-wall corrugated board. Also frequently used for packaging is chipboard, which is made from waste paper and mostly grey in color. The flexibility of the chipboard depends on its thickness, but generally this material is more likely to crack when folded than corrugated fibreboard of comparable thickness. Because of its color and rough, absorbent surface, it is not very suitable for printing. Naturally, the outline of a package design needs to be die-cut. Furthermore, to reduce the stress that folding puts on paperboard, it must be scored (or creased) before being folded. There are some variations to full cuts and scores: the partial cut which does not penetrate completely through the board, but not continuously; and the cut-crease, in which cutting and creasing is alternated.

corrugated cardboard – картон (многослойный материал, имеющий один, два, три или более плоских слоев Изготовляют 2-, 3-, 5- и 7-слойный гофрированный картон используемый для производства транспортной, а картон с микрогофром – потребительской тары)

disposable – находящийся (или имеющийся) в распоряжении; свободный;

shrug off – игнорировать, не обращать внимания

packaging tape – упаковочная лента

fold – складывать, сгибать

reinforce – укреплять, усиливать

spill out – высыпаться, проливаться

coat – покрывать

fibreboard – гофрокартон

single-faced corrugated board – картон двухслойный односторонний (гофрокартон, состоящий из одного плоского и одного гафрированного слоя)

ascending – возрастающий

rigidity – жесткость, твердость

single-, double-, and triple-wall corrugated board – одно, двух, трехслойный гофрокартон

chipboard – макулатурный картон (изготовленный из макулатуры (вторичный, обычно низкосортный)

die-cut – высекать

score – забивать

crease – загибать

Did you know?

Tetra Recart is the first retortable cartoon sys tem on the market, ever. It can stand 100 % humidity at 30 degrees Celsius for more, than two hours. Consumers benefit from great convenience and safety advantages. Retailers get an efficient and communicative solution to distribute food.

Food producers get a cost and capacity competitive alternative to the metal food can that is excellent for differention and revitalization.

A new way of using «bag-in-box» of wine package. Flip-box combines the BiB principle with the cover to be used as the base when turned 180°, thereby lifting the box and eliminating the well-knowing problem: pouring the wine from the tap into the glass. The hidden flaps stabilise the winebox and create a suitable space in front to fill the glass with wine. Normal use is still possible. The «Flip-box» is optimised for existing packaging system.

Elastic Returnable Package (Inverter Hydraulic Unit). This is a rational packaging which is elastic and returnable. It has 3 patterns of packaging specifications according to the existence of product options and the packaging procedure. The packaging materials can be shared. Additionally, by improving conventional packaging for heavy products which uses the wooden frame box to the cardboard packaging which is lightweight and easy, the volume after use dramatically reduced to 1/5 and returnable easily.

TEXT 2. Glass

The best packaging is glass because of its chemical stability. Industry tries to change glass by one-way packages made of glass because of price and weight. Glass is one hundred percent barrier against oxygen. Glass however can break. The small splinters being undetected present a great hazard to consumers. The industry spends great efforts to avoid any fragmentation. Glass is inert. There is no migration of components of the plastics to the food. There is no danger of intake of plastic components and other chemicals and there are no alterations of taste caused by these

substances. Glass is a perfect barrier to atmospheric oxygen, avoiding rancidness, changes of color such as brown color of Ketchup. Mineral water with carbon dioxide however shows off flavor immediately. That is why glass bottles are still used for this kind of beverage.

splinter – осколок
hazard – риск, опасность
fragmentation – дробление, раздробление
intake – всасывание, поглощение, потребление; приемное, впускное или всасывающее устройство;
alteration – деформация
rancidness – прогорклость
show off – показывать в выгодном свете

Did you know?

Traders Point Creamery's award-winning cottage cheese is now available in recyclable glass containers. The glass containers are manufactured by Verallia and distributed through Stan Pac.

By using a glass container, the cottage cheese is preserved in a non-porous and impermeable container, extending the shelf life of the product compared to plastic containers. The glass jars maintain the cottage cheese's integrity, meaning none of the leaching that occurs with plastic containers happens in the new glass jar and the shelf life of the cheese is extended, especially compared to plastic packaging.

Coca‑Cola's history has got a lot of bottle - more than 115 years' worth, in fact. The world's favourite soft drink started life as a soda fountain beverage, selling for five cents a glass, but it was only when a strong bottling system developed that Coca‑Cola became the world-famous brand it is today.

TEXT 3. Tin

Most foods contain very low concentrations of tin. Tin cans are widely used for packaging of pasteurized and sterilized food. Canned foods may contain higher levels because the tin coating used to protect the steel body of the can from corrosion can slowly transfer into the food.

Tin leaching presents no health effect on the consumer apart stomach upsets such as nausea, vomiting, diarrhoea, abdominal cramps and bloating in some sensitive people at levels above 200 milligrams per kilogram. This is the maximum legal amount of tin that can be present in canned foods.

Metal ions were drastically reduced by internal coating the cans with layers of varnish. Small cracks of the varnish layer can cause black dots when chicken meat is present. The iron of the can reacts with the sulphur of the protein molecules of the resulting iron sulfide. Quality inspection of the varnish coating is therefore very important.

tin – олово, белая жесть, оловянная посуда, жестянка; консервная банка

leaching – выщелачивание

abdominal cramps – спазмы в животе

bloating – вздутие живота

internal coating – внутреннее покрытие

varnish – лак, лаковое покрытие

Did you know?

With more than 75 years of experience baking Europe's favorite cookies, Lotus Bakeries announces the release of new packaging for Anna's Thins, available now throughout North American markets. The new packaging was created by award-winning design firm Turner Duckworth for all four Anna's Thins flavors: Ginger Thins, Almond Thins, Orange Thins and Chocolate Mint Thins.

«The Turner Duckworth design team has done an excellent job of honoring - yet energizing - the look and feel of the original Anna's Thins, which many have grown to know and love».

Anna's Thins are known around the world for its 100 year-old secret family cookie recipe, which originated in Sweden by the Karlsson family in 1929. Today, more than 1 billion Anna's Thins are sold globally, making them the world's best selling ginger thins. Baked in Sweden using all natural ingredients, Anna's Thins are perfectly thin and deliciously crisp.

TEXT 4. Polymeric packaging materials

Packaging made of plastics present new advantages. There are rigid and flexible packages. Flexible packages may present active and barrier properties. This is used for meat packaging. At first the package acts actively to get rid of excessive moisture and works then as a barrier against oxygen. PP and PET is gaining ground because of lighter weight com-

pared with glass and being unbreakable. There are many types of plastic containers and they come in all shapes and sizes; large and small. These are not the best option for moving because they cost and weigh more than cardboard. In the case of storage or organization, however, they are great. Sometimes storage units are susceptible to water damage, infestation and rodents. Storing items in plastic containers will assure that they are protected from all of these things. They allow you to store things fashionably. As they come in all shapes and sizes they can be great to store things as small as crayons or as large as books in. Plastic containers also allow you to store things decoratively. They often come in an array of colors often with patterns and designs.

Plastics can also bear poisons from herbicides, insecticides and other pesticides when the bottle was wrongly used for these substances. Reusing bottles which had been used before endangers the health of the consumer because of migration of the polycyclic aromatic components.

PET bottles are being used increasingly for soft drinks such as cola and soft drinks, because off flavor caused by migration of plastic chemicals to food is not noticed by the consumer because of the dominance of the product flavoring. To detect and discard these bottles a complicated system called «sniffer» is being used detecting volatile compounds of pesticides which might be present in some bottles. This system covers only a special group of substances. It does not give an ultimate solution to avoid reusing contaminated packaging.

rigid – жесткий, негнущийся, негибкий; твердый
flexible – гибкий; гнущийся, эластичный
moisture – влага, влажность
to gain ground – продвигаться вперед, делать успехи, преуспевать, распространяться
to be susceptible – быть восприимчивым
infestation – заражение
rodents – грызуны
crayon – цветной карандаш, цветной мелок, пастель
array of colors – множество цветов
endanger – подвергать опасности
volatile – летучий
contaminated packaging – загрязненная упаковка

Did you know?

Constantia Teich's portion pack for Chocomel Hot from Friesland Foods Western Europe creates a convenient dispensing cup-shaped pack for a hot chocolate drink for use in the popular Senseo® pad machines. The packs consist of a cup with a top and a bottom foil-based die cut lidding material. The top lid is a high sophisticated double layer lid. The end user peels of the aluminum foil and sets free a plastic lid which has exactly sized and positioned holes. On the bottom of the cup there is a deep drawn special lid with an integrated weakening that ensures a controlled push-through in the brewing machine for the flow-off of the drink. Friesland Foods' system employs a simple adapter to hold the 'cup' instead of the standard coffee pads used by Senseo® coffee machines.

Coca Cola surprised its fans by representing its bottles with a modern young and «awesome» clothing. Sleever International Technology (using the OPS TF 60 film) allowed Coca Cola to launch a key product by means of an amorphous, wearing and shrinking concept.

Alcan Packaging Zutphen had the judges purring with delight with its eye-catching organic shape alufoil tray with easy-open lid for Sheba Essence from Mars Petcare Europe. Designed in close co-operation with Mars, the PP laminated aluminum tray features all over printing in seven color rotogravure. The 360 degree printing is flashy and clear, providing excellent on-shelf differentiation and positions the brand clearly as a premium product. The shape and the technical achievement in creating the all over print for this high-valued added cat food mean this pack really stands out from the crowd. The Sheba Essence pack is very different from traditional packs for wet cat food and creates real opportunities for branding and on-pack.

TEXT 5. Bioplastics

What are bioplastics? Plastics resins which are biodegradable or derivative of plant raw materials are referred to as bioplastics. There has been an increasing interest in application of bioplastics in the world today. This is attributed to the increasing prices in oil prices and the decreased supply for raw materials used to manufacture petrochemicals. Bioplastics are similar to traditional plastics in their application but the difference is that they are characteristic biodegradable in a specified composting cycle.

In an effort to promote the growth of petrol packaging, bioplastics are being developed using renewable raw materials like starch, cellulose, sugar gelatine, chitin, polyhydroxicarbon, acid ester and polyamin acid. Their price is, however, up to four times higher as petrol originated plastics. The world production of bioplastics in 2004 summed only 250.000 tons. Some bioplastic articles are foamed duro plastic from starch, for example trays for vegetables and other foods and bottles from PLA for mineral water. The packaging material, called Calymer from Ecolean, consists of 40% calcium carbonate and polymers, which simply act as

the binding agent. This material is flexible and tough with exceptional environmental properties.

Metabolix, a US-based bioscience company, is set to develop a new industrial-scale crop which could impact heavily on the future profitability of bioplastics. Metabolix is commercializing a type of bioploymer technology, known as polyhydroxyalkanoates (PHA). PHA is a biodegradable, starch-based plastic resin that could be used in packaging and other applications. PHA has advantages over other biodegradable plastics, such as PLA. For example, PHA is very durable, and will not begin to degrade until it is placed in a composting site or landfill as it has enzymes, rather than oxygen or light, that cause the material to break down. Metabolix is also using GM technology in plant science to produce non-food crop grasses, such as switchgrass.

Bioplastics helps to offer a solution to the disposable problems in plastic application. This is because; they are biodegradable, meaning that they can be recycled and thus reused again. Most industries prefer the use of bioplastics raw materials compared to traditional raw materials. This is because of the advantages accrued with the use of these materials. An industry that produces bioplastics have a wide range of raw materials, that's of high quality at a cheaper price and thus creating a competitive advantage.

Bioplastics production also allows the incorporation of new technologies in the manufacturing and processing techniques. They also help to create new fields of business due to the niche products manufactured from bioplastics. Their biodegradability characteristic is practical and thus environmental friendly. Bioplastics products help to enhance sales through packaging of such food products as organic materials on packages that are compostable.

biodegradable – биоразлагаемый
derivative – производный
composting cycle –
starch – крахмал
chitin – хитин
acid ester – кислотный эфир
a new industrial-scale crop – новая промышленная культура
polyhydroxyalkanoates – полигидроксиалканоаты

biodegradable, starch-based plastic – биоразлагаемый пластик на основе крахмала

durable – прочный, длительного пользования

to degrade – разрушать, приходить в упадок

landfill – свалка

enzymes – энзим, ферменты

switchgrass – просо

Did you know?

Sourced from biomass, bioplastic products are typically made from plant matter such as vegetable starch, cane sugar, cellulose (wood fibers) and lactic acid. In the foodservice industry, applications range from clear food trays and containers to organic waste bags.

The production and use of bioplastics is generally regarded as a more sustainable activity when compared with plastic production from petroleum (petroplastic), because it relies less on fossil fuel as a carbon source and also introduces fewer, net-new greenhouse emissions if it biodegrades. They significantly reduce hazardous waste caused by oil-derived plastics, which remain solid for hundreds of years, and open a new era in packing technology and industry

TEXT 6. Eco-friendly Packaging

Plastic packaging and coatings are often singled out as among the chief contributors to the current environmental crisis. Technology currently exists to make packaging that is eco-friendly. It is only being used on a small scale, as yet. Eco-friendly packaging ranges from bioplastic containers, stretch wrap, and filling, to natural cellulose foam. Many packaging manufacturers are working on innovative ways to reduce the environmental impact of packaging, including making packaging biodegradable. Biodegradability refers to the ability of a product to be broken down into simpler forms by living organisms, thus reducing its persistence in the environment in its original form. Petrochemical plastics are persistent in the environment.

Many biodegradable plastics are made from plant sources, particularly corn, wheat and potatoes. The starch is extracted from the plant material, subjected to micro-organisms that cause lactic acid to form long-chain polymers and results in poly lactic acid or PLA. Not only are plant plastics – bioplastics – biodegradable, they are also made from renewable resources thus reducing pressure on finite petrochemical supplies.

Some existing packaging options can be made biodegradable. EPI Environmental Plastics Inc. in Canada have developed TDPA (Totally Degradable Plastic Additive), which when added to the packaging allows it to retain its physical characteristics until it is in the right environment to degrade – oxygen, moisture, naturally occurring organisms, plus, sunlight, heat or mechanical stress. In this environment it then breaks down leaving only carbon dioxide, water and a small amount of original material. This presents a cheaper option than bioplastics, but although it has FDA approval, its long-term safety has not been tested.

Recycling packaging reduces the environmental impacts marginally. The real solution is in changing what we eat and how we get what we eat. If we ate mostly fresh fruit, vegetables and grains that we either grew ourselves or purchased from local growers, packaging would change enormously. Our health would improve and we would find a greater connection to our community and bioregion.

stretch wrap – растягивающаяся пленка
persistent – стойкий, устойчивый

poly lactic acid – поли молочные кислота

ACTIVITIES

- ❖ Working in small groups fill in the table, making comparison of different types of packaging.

	Paper and cardboard	Glass	Iron	Aluminium	Plastic
Main characteristics					
Products					

- ❖ Here is a list of different products we purchase every day. What type of packaging would you chose, if you were a producer of one of these products? Chose one of the products and design a container for it. Make a short presentation.

Wine, candies, milk, juice, fizzy mineral water, cosmetics, tinned fruits, biscuits, beer, furniture, electrical appliances, honey, etc.

Part 3. Bionic methods in design and packaging

«Today poetic design is based on a plethora of complex criteria: human experience, social behaviors, global, economic and political issues, physical and mental interaction, form, vision, and a rigorous understanding and desire for contemporary culture. Manufacturing is based on another collective group of criteria: capital investment, market share, production ease, dissemination, growth, distribution, maintenance, service, performance, quality, ecological issues and sustainability. The combination of these factors shape our objects, inform our forms, our physical space, visual culture and our contemporary human experience. These quantitative constructs shape business, identity, brand and value. This is the business of beauty. Every business should be completely concerned with beauty – it is after all a collective human need. I believe that we could be living in an entirely different world – one that is full of real contemporary inspiring objects, spaces, places, worlds, spirits and experiences. Design has been the cultural shaper of our world from the start. We have designed systems, cities, and commodities. We have addressed the world's problems. Now design is not about solving problems, but about a rigorous beautification of our built environments. Design is about the betterment of our lives poetically, aesthetically, experientially, sensorially, and emotionally. My real desire is to see people live in the modus of our time, to participate in the contemporary world, and to release themselves from nostalgia, antiquated traditions, old rituals, kitsch and the meaningless. We should be conscious and attune with this world in this moment. If human nature is to live in the past – to change the world is to change human nature»

Karim Rashid, a designer.

The term «bionic» was first coined in the mid-twentieth century, which is aimed at applying biological studies to technical aspects such as architecture, industrial design, and material science. Related researches on bionic study were mostly carried out by the Westerners, and so as the design cases in forms of bionic product and architecture.

The methodology of bionic design is based on the idea of organisms' characters. Through the process of immersion, experience, transformation and application, the principles of organisms that have been discov-

ered can therefore decoded and transplanted as the foundation of the artificial objects, in which bionic is usually applied to the aspects of information, control, mechanism and chemistry.

rigorous – скрупулезный, тщательный
sustainability – устойчивость
kitsch – массовая продукция, рассчитанная на низкие вкусы
to be attune with – быть настроенным на что-либо
immersion – погружение, иммерсия

3.1. The pioneer of bionic design: Luigi Colani

«Whenever we talk about bionic design we should simply bear in mind just how amazingly superior a spider's web is to any load-bearing structure man has made – and then derive from this insight that we should look to the superiority of nature for the solutions. If we want to tackle a new task in the studio, then it's best to go outside first and look at what millenia-old answers there may already be to the problem».

Luigi Colani.

Luigi Colani was born in Berlin, in 1928, studied sculpture at the Academy der Künste in Berlin and at the Sorbonne in Paris. He became a head of New Materials project group at McDonell-Douglas in California in 1953 and originator of Fiat designs for the coming years. He designed the first sportscar to drive round the Nürburgring and clocked a lap in less than 10 minutes, World's first monocoque sportscar: BMW 700, world's first kit car in series: Colani GT, first plastic sports airplane with Wankel-engine: Fanliner, Canon T-90, optical frames and jewellery collection. Born in Berlin in 1928, Luigi Colani embarked on his extraordinary career as a designer in Paris in the early 1950s, focusing at first on automobile design.

After studying aerodynamics at the Sorbonne and a period spent in the United States working for aircraft-maker Douglas, where he was able to study the use of new materials, in 1953 he moved to SIMCA in France where he developed the very first fully plastic carbody. And ever since, the design and use of plastic has played a crucial role in his cosmos.

In 1955, Colani returned to his native Berlin, with a head full of great visions and a portfolio of international experience. Back in the former capital, he started to devise prize-winning chassis designs for high-end carbody makers Erdmann & Rossi and Rometsch. At the same time, he advanced his plastic designs and this culminated in the 1960s in his compact Colani GT sportscar, which was available as a DIY kit on a VW platform and swiftly emerged as an icon of life in the 1960s.

The plastic furniture Colani produced in the 1960s for German manufacturers made him a world-famous Pop star of design. In 1972, in the moated Castle Harkotten in Central West Germany, Colani the multitalented genius established a «Designfactory» that gave a new shape to almost all spheres of life by bringing innovative shapes and revolutionary concepts to bear. In the 1970s, he prepared studies for high-performance gliders ready to sail across the Atlantic, oil tankers with new types of propellers.

For over five decades now Colani has been the unabashed agent provocateur of the design world. He thinks in terms of grand utopias, creating ingenious drafts for designs that preempt much of what is not yet technically feasible (Fig. 1).

Fig. 1. New piano for SCHIMMEL, 1997

While the design world has spent decades endeavoring like the Renaissance to quantify design tasks in terms of rules and laws, Colani acts like the Mannerists who succeeded the Renaissance and breaks all the rules to paint an unpredictable and moving picture of how the future could be designed. It is precisely because of these qualitites that at present Colani's working ideas are being rediscovered and reinterpreted world-wide – driven by a younger generation of designers such as Ross Lovegrove and Karim Rashid, who likewise believe that anatomy, tech-

nology and 3D shapes must form the basis if design is to be duly holistic and biomorphic. Colani, with his creativity and entirely novel approach for perfect and practical design of appliances and devices, even mundane objects, as well as complete industrial designs in terms of ergonomics, aerodynamics and functionalities, is a great designer of international renown well ahead of his time.

Luigi Colani is No. 1 industrial designer in Japan, headquarters with major design team at Harkotten Castle near Sassenberg, Germany. Yet, in his modesty, he sees himself merely as an interpreter of Nature. Colani is closely observing Nature where development over aeons has produced uncountable wonders of perfection and beauty, and he further analyzes, adapts, adjusts and implements. The results, naming only a few, speak for themselves: «The earth is round, all the heavenly bodies are round; they all move on round or elliptical orbits. This same image of circular globe-shaped mini worlds orbiting around each other follows us right down to the micro cosmos. We are even aroused by round forms in species propagation related eroticism. Why should I join the straying masses who want to make everything angular? I am going to pursue Galileo Galilei's philosophy: my world is also round».

Fig. 2. The bottle designed by Luigi Colani for Valser Viva,
a Coca-Cola company in 2002

unabashed – унерастерявшийся, несмутившийся
ingenious – изобретательный, искусный
preempt – завладевать раньше других
feasible – осуществимый, выполнимый
holistic – целостный
novel – непривычный, оригинальный
mundane ['mʌndein] – светский; мирской, земной

Did you know?

Jonathan Ford is a designer and co-founding partner of «Pearlfisher». Jonathan is also a Trustee of The Haller Foundation, and Director of the D.B.A. (Design Business Association). He oversees a portfolio of award-winning designs, including a high-profile list of ethical, entrepreneurial and iconic brands.

Help Remedies® announces the of help I've cut myself & I want to save a life, which supplements Help's standard adhesive bandages with a bone marrow donor registry kit. This extension of the help I've cut my self bandages was created for a great cause and the design is definitely worth sharing.

Wally Olins is «the world's leading practitioner of branding and identity», according to the Financial Times. He has advised many of the world's leading commercial companies, including 3i, Renault, Repsol, BT, Volkswagen, Tata and Lloyd's of London; he is the author of several successful books, including Corporate Identity, Wally Olins on B®and and The Brand Handbook. Jne jf his projects Menos es Mas – Less is More in Spanish – stands for what it is. It doesn't make you taller or thinner or more beautiful. It's just an environmentally friendly drink that delights and refreshes. Saffron worked with Coca Cola, Spain, to create the joyful expression of this mighty little drink.

ACTIVITIES

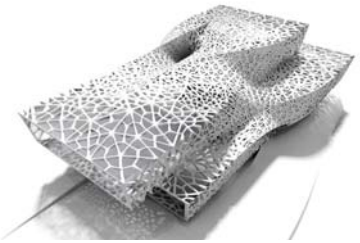
- Prepare a short report on bionic design. Point out the term itself, spheres of application and its role in the sustainable development of packaging.

- You could call Luigi Colani one of the most influential and underrated designers of the 20th and 21st centuries. Describe his philosophy using the following words and phrases:

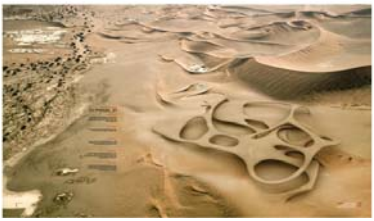
to coin; to look to the superiority of nature for the solutions; to devise prize-winning designs for; a world-famous designer; to give a new shape to almost all spheres of life; ;to bring innovative shapes and revolutionary concepts to bear; to create ingenious drafts for; to quantify design tasks in terms of rules and laws, etc.

- Luigi Colani is No. 1 industrial designer, headquarters with major design team at Harkotten Castle near Sassenberg, Germany. You've gone through a series of tough tests and interviews. Now you are a member of Colani's team. Look around and create your own design for … . Make a short presentation.

3.2. Bionic design in architecture



Jellyfish House by Iwamoto-Scott: Iwamoto-Scott, a SF based architecture firm has designed the Jellyfish house. They argue that similar to the sea-creature, their building coexists with its environment as a set of distributed, networked senses and responses. Similar to the organism, the house attempts at being a responsive structure, adapting to the different conditions around it and adjusting accordingly with help of a «deep skin». «The skin of Jellyfish House combines structure and envelope with these physical infrastructures. What unites them conceptually is that they create an ambient experience in the home that reveals the work of the skin in largely a peripheral manner. In this regard, the project expands upon aspects of «calm», or ambient, technology that suggests the digital realm will ultimately recede to the background of our spaces and lived experience. The project revisits the digital and the material by cultivating this latent technological relationship while still offering a productive, non-naturalized awareness of the forces at work around us».



Student Magnus Larsson won the Holcim Foundation's Awards for **Sustainable Construction** for his proposal to stop the sprawl of the Sahara desert by stabilizing it with the introduction of bacterium that could potentially convert large parts of the desert into limestone structures literally built by nature.

Fiber Composite Adaptive Architecture: The team, which consists of Sakthivel Ramaswamy and Konstantinos Karatzas in addition to Maria Mingallon set out to design a building system that through the replication of an adaptable unit and use of

self-organization principles found in nature, creates an adaptive structure that can potentially take any form and establish comfortable lighting and ventilation conditions through the constant maintenance of its envelope. This is another valiant effort towards designing truly «living» buildings that respond to their environments. Thermo-morphogenesis' refers to the change in shape, structure and material properties of organisms when exposed to particular environmental conditions. Fiber composite aims to bring that adaptive life to the places we shelter ourselves, a fully responsive building.

Architecture of the Dragonfly Wing: Maria Mingallon who graduated from the AA and a professor at McGill University, along with students Jheny Nieto, Sakthivel Ramaswamy and Konstantinos Karatzas, study the architectural applications of the dragonfly wing. In the words of the team «the morphology of the dragonfly wing is an optimal natural construction via a complex patterning process, developed through evolution as a response to force flows and material organization. The wing achieves efficient structural performance through a nonlinear variation of pattern, corrugations and varied material properties throughout the structure».

The team explains that the seemingly random variation in the natural pattern of the wings were in fact optimized to allow rigid and flexible configurations along the span of the wings that allow for a logic based use of ambient energy for the purposes of flight. The patterns of the wings follow the general tensile forces exhibit on the wing. The various shapes carry the responsibility of determining the amount of stiffness or flexibility in that area of the wing. For example the quadrilateral areas on the edges determine the more rigid and stiff portions of the wing while the largely compartmentalized hexagonal areas are responsible for the areas more likely to bend and sway. Furthermore, connections between the cells also determined the degree to which adjacent cells were free to bend. In the report that it was also highlighted that: «Two main types of joints occur in the dragonfly wings, mobile and immobile. Some longitudinal veins are elastically joined with cross veins, whereas other longitudinal veins are firmly joined with cross veins. Scanning electron mi-

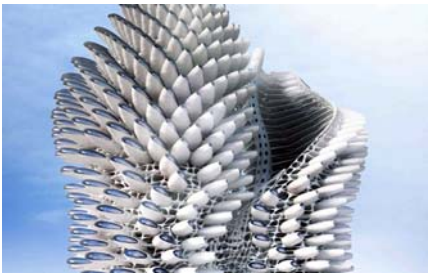
croscopy reveals a range of flexible cross-vein and main-vein junctions in the wing, which allows local deformations to occur. The occurrence of resilin, a rubber-like protein, in mobile joints enables the automatic twisting mechanism of the leading edge».

The interesting part of all biomimetic research are its potential applications to the field, the next except is a summary from the team expressing how they feel their research can be applied to construction techniques. «Specialization of different areas for support and deformability is nearly universal in insect wings. These properties present to us an interesting field of research on structures that could change constantly, but retain their equilibrium through a complex geometrical logic. Buildings can be envisaged as envelopes made of complex flexible foils, abstracting the geometrical logic of the dragonfly wings. The property of rigid quadrangular geometry and a more flexible polygonal geometry could be used to build a surface on deriving the different morphologies that could be obtained by passive deformation under uniformly applied loads. The distribution of constrain points within the grid follows a similar logic to that of the dragonfly wing, in which the mobile and immobile joints are distributed in order to enable corrugation in a particular direction».

MAD Architects have designed **a tower and hotel** to be built in Beijing inspired by the honeycomb nature of beehives. What seems like an undulating facade from far away is actually a regular grid of equally sized hexagons but with varying degrees of opening. Regulation of thermal gain and optimum degree of light dictated the pattern across the entire building.

The Gherkin Lord Foster's Natural Inspiration: Sir Norman Foster's Gherkin Tower is a very well known building on its own, but many fail to realize its famous hexagonal skin was inspired by the Venus Flower Basket Sponge. This special sponge

hosts a lattice-like exoskeleton that appears glassy and glowing in its underwater environment. The various levels of fibrous lattice work help to disperse stresses on the organism in various directions and its round shape reduce forces due to strong water currents, both of which were applied to Foster's design of the tower.



Chimera design team has designed a spiraling skyscraper solution for New York City inspired by the Mangrove Tree habitat. Sucker PUNCH did a profile of their project named Mangalcity here as well as Inhabitant here. Both great posts with lots of insight, from the various readings the main motivation for this degree of capsulation was to allow every single pod to adapt to its environment and context independently, similar to how each leaf or branch on a tree works it's hardest adapt on its own. The interior spaces and resulting negative space are truly stunning. The super structure holding the pods seems highly flexible and airy. Chimera design team also mentioned in their interview they were inspired by the Phyllotaxis phenomena where plants distribute leaves on a branch in various patterns in response to their environment.

How a Pinecone Adapts: Dr. Veronika Kapsali from MMT Textiles with help from the University of Bath's Biomimetics Group has developed a fabric inspired by the pinecone's natural ability to open and close itself when exposed to moisture. Their temperature sensitive product adapts to its surrounding conditions with thousands of small wool fibers that rise or fall to create more or less heat resistance.

ACTIVITIES

❖ Test your knowledge in how color influences what we buy by answering the following questions.

1. In food-package design, what is the most popular color for manufacturers to use?
2. When manufacturers wish to make an item appear bigger, which color is most often used?
3. What color is most widely used for bathroom products?
4. What color is most widely used to project luxury and premium quality?
5. What color is most widely used for low-fat, low-calorie packaging?
6: What color is a favorite for seafood packaging?
7. What color do designers mostly use to project that a product is inexpensive?
8. If you were a packaging expert and you were deciding the color for the low-fat version of your product, what color would you most likely chose for your package?

❖ Working in small groups develop a bionic design for:

Glass and bottles packaging
Color packaging for cakes
Custom candies and sweet packaging
Packaging for cigarettes
Cosmetic packaging
Food packaging
Packaging for bulbs
Medicine packaging
Miscellaneous packaging

New products appear on store shelves every day. Very often there is only a slight difference between these products in terms of quality and content. Thus, a good packaging is a very powerful tool for winning the buyer.

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Учебное издание

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PACKAGING. HISTORY. PACKAGING MATERIALS. BIONIC DESIGN

УПАКОВОЧНОЕ ПРОИЗВОДСТВО. ИСТОРИЯ. УПАКОВОЧНЫЕ МАТЕРИАЛЫ. БИОНИЧЕСКИЙ ДИЗАЙН

Учебно-методическое пособие
для студентов технических вузов
специальности 1-36 20 02 «Упаковочное производство»

Технический редактор *О. В. Песенько*

Подписано в печать 24.12.2013. Формат $60\times84^{1}/_{16}$. Бумага офсетная. Ризография.
Усл. печ. л. 3,14. Уч.-изд. л. 2,45. Тираж 100. Заказ 436.
Издатель и полиграфическое исполнение: Белорусский национальный технический университет. ЛИ № 02330/0494349 от 16.03.2009. Пр. Независимости, 65. 220013, г. Минск.