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Тексты и упражнения для чтения и развития устной речи для студентов специальности 1-50 01 01 «Производство текстильных материалов»

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СОДЕРЖАНИЕ

1 STICKY COMFORT

Study the meanings of the words:
sticky – липкий;
apply for – обращаться;
adhesive plaster – липкий пластырь;
strip – полоса, лента;
bandage – бинт;
gauze bandage – марлевый бинт;
absorb – поглощать;
layer – слой;
stick – липнуть.

On March 28, 1882, the Hamburg (Germany) pharmacist Carl Paul Beiersdorf applies for the l Patent No. 20057, for "the production of adhesive plasters". At the time, nobody could have known that this patent would become the foundation for a big international enterprise - Beiersdorf AG. At first, the adhesive strip used to hold bandages is not a great success. The gauze material can be applied to the skin with ease and at room temperature.

So, Oscar Troplowitz, who buys Beiersdorfs company in 1890, begins to look for alternatives. In 1901 he invents Leukoplast®, a skin-friendly way of affixing gauze material. In 1921, Beiersdorf introduces the first adhesive bandage: Hansaplast® is self-adhesive and absorbs blood into the integrated wound cover - about 14.5 billion adhesive bandages have been produced to date.

The field of wound care did not remain untouched by high-tech developments: Today, plasters can be sprayed on, they have hypoallergenic, waterproof or extra-strong adhesive, are equipped with a layer of anti-microbial silver or with gel wound covers.

Bandages used for severe or chronic wounds have a ceramic layer to prevent the bandage from sticking to the wound.

Adhesive bandage

Good to know:

In the US, the medical strip also creates successful careers: Because his wife is always cutting her fingers, in 1920, Earle Dickinson attaches a gauze bandage to a strip of adhesive tape and covers it with a protective layer of tulle – and stockpiles the little helpers. His boss, James Johnson, likes the idea and merchandises the invention as Band-Aid plasters. He promotes his previous cotton buyer to vice-president of Johnson & Johnson.

Answer the following questions.
1. What was Beiersdorf?
2. What patent did he apply for?

3. What was the adhesive strip used for?
4. How can it be applied?
5. What did the company invent?
6. What did Beiersdorf introduce?
7. What is Hansaplast?
8. How can plasters be used?
9. What properties do plasters have?

2 AIR PROTECTION FOR ALL

Study the meanings of the words:
airbag – воздушная подушка;
protect – защищать;
injury – рана, ушиб;
inflate – надувать;
collision – столкновение;
breakthrough – прорыв;
developer – разработчик;
retard – замедлять;
ignite – воспламенять;
propellent – взрывчатое вещество;
owe (to) – быть обязанным;
shell – оболочка.

As early as in the 1920s, Arthur Hughes Parrot and Harold Round wanted to protect airplane passengers in the US from injury with permanently inflated airbags. Still the technology necessary to inflate them quickly in case of a collision would not be available for decades.

The breakthrough in "air protection" was achieved in 1971 by a group of developers of Daimler Benz AG (today Daimler AG): A sensor registers particularly strong retarded acceleration, typical for collisions. This ignites a propellant, which the explosion transforms mainly into nitrogen gas. The nitrogen blows up the airbag in fractions of a second, which in turn cushions the passenger.

In 1981, the airbag was first available as an optional equipment for the S class Mercedes.

Today, thousands of people owe their lives to airbags made from extremely durable polyamide fabric. Up to 15 airbags protect passengers not just in the case of a frontal collision, but also of side and offset collisions - and this applies to almost all vehicle segments.

The textile shell of the airbag is still sewn at present. But soon, the individual elements will be welded together by laser. This would further improve seam quality, making it possible to construct future airbags with seams of different strengths and

with strategic interruptions in the seam to make the airbag inflate stepwise.

Airbag

Good to know:

Today, airbags do not just protect passengers in cars and buses. Due to the extreme expansion of their own volume, skiers and mountain climbers can now reduce the danger of being buried in an avalanche.

Answer the following questions.

1. What did Parrot and Round want?
2. How did they protect passengers?
3. Who invented this technology?
4. When was the first airbag available?
5. What are the airbags made from?
6. What airbags protect passengers from?
7. How is the textile shell made?
8. Can laser technology be used?
9. What does it improve?

3 WORLD WIDE WEAVE

Study the meanings of the words:
loom – ткацкий станок;
create – создавать;
pattern – образец;
contain – хранить;
strip – полоска;
punched paper – перфокарта;
needle – игла;
break – прерывать;
weave – ткать;
turn into – превращать;
to be employed – работать;
raise / lower – поднимать / опускать;
warp thread – нить основы;
steam engine – паровой двигатель.

In 1805, with inventing a fully automated pattern-loom, the Frenchman Joseph-Marie Jacquard creates the first "programmable" machine ever. The pattern information is contained on long strips of punched paper, which are read by a needle: A hole means a raised warp thread, no hole means a lowered warp thread.

In 1840, Louis Ferdinand Schonherr of Chemnitz breaks the dominance of

English engineers, constructing the first fully mechanized cloth loom. This technological innovation is the starting point of the industrial revolution and the subsequent drastic societal changes: Mass production is moved from the workers' homes to the factories, independent weavers turn into dependant factory workers, and more women are employed as workers instead of being homemakers.

On the first automated looms, workers still raise and lower the warp threads and pass the weft. But it does not take long for these steps to be automated as well - the necessary energy is supplied by water wheels and, beginning around 1870, by steam engines.

Modern looms work with compressed air to pass the weft, reaching speeds of up to 800 moves per minute. The latest control technology allows for the creation of complex patterns on panels ranging in width from a few centimetres to 5 metres - with up to 12,000 individually controlled warp threads.

Automatic pattern-making power loom

Good to know:

In order to reach the daily production output of a modern weaver, who operates approx. 15 looms simultaneously, his colleague in the early 19th century would have to work his mechanical loom 8 hours a day for about 5.2 years.

Answer the following questions.

1. What did the Frenchman Jacquard create?
2. Where was the pattern information contained?
3. Who broke the dominance of English engineers?
4. What did he construct?
5. What did this invention mean?
6. What changes did it bring?
7. How was the necessary energy supplied?
8. How do modern looms work?
9. What speed do they reach?
10. What does the latest technology allow?

4 BEING WELL GROUNDED

Study the meanings of the words:
carpet – ковер;
woven carpet – тканый ковер;
custom – обычай, традиция;
floor – пол;
durability – прочность.

Colourful hand-knotted oriental carpets are coveted luxuries in the late 19th century. So the brothers Carl and Adolf Vorwerk hope to do brisk business when they found the company now known as Vorwerk & Co. Teppichwerke GmbH & Co. KG in 1883 and begin the production of customised woven carpets in standard sizes.

Like so many other inventions, wall-to-wall carpeting as we know it today was a serendipitous accident: Instead of the standardized individual carpets, the factory produces long carpet panels by mistake. Carl Vorwerk recognizes the potential of these "rejects" as a new interior design idea and applies for a patent for the continuous woven carpets in 1901.

In the 1950s, pile carpets find their way into many German living rooms, in 1959, the company Anker-Teppichboden Gebr. Schoeller GmbH & Co. KG presents carpeting made from Perlon®, a man-made fibre that combines the textile comfort of carpets with the durabiliy of hardwood floors, thus paving the way for the use of carpeting in public buildings.

The carpets of the new millennium are not just practical and beautiful but "intelligent". The smart floor® by Vorwerk works with Radio Frequency Identification Chips (RFID) underneath the carpeting, which make it possible to control cleaning robots and other devices. Intelligent microchips turn the carpet into a burglar alarm system.

The duraAir® carpet by Dura Tufting GmbH has unique functionalities that transform harmful substances like nicotine and formaldehyde into harmless steam and carbondioxide.

Carpeting

Good to know:

Tufting is the most efficient and versatile production method for carpeting. Many needles arranged in rows push threads into a carrier material with working widths up to 5 m.

Answer the following questions.

1. What company did the brothers Vorwerk found?
2. What did they want to produce?
3. Was wall-to-wall carpeting usual for those times?
4. How did the company recognize this potential?
5. What patent did it apply for?
6. What carpets appeared in Germany in the 1950s?
7. What carpeting did the company present in 1959?
8. What properties did man-made fibres have?
9. What properties do the carpets of the new millennium have?
10. What does the smart floor make possible?
11. What functionalities does the duraAir carpet have?

5 THE NAME OF THE ROSE

Study the meanings of the words:
blend – смесь;
swell – набухать;
wrinkle – складка;
embroidery – вышивка;
mainstay – опора;
maintenance – уход, обслуживание;
shirt – рубашка;
hollow – пустота;
a side effect – побочный эффект;
acquire – приобретать;
sheen – блеск;
moisture – влажность;
smooth (out) – сглаживать.

Cotton shirts are a fashion classic - if it wasn't for this annoying ironing! This is what Gerd Seidensticker (Seidensticker GmbH) thinks in 1968, as he begins marketing drip-dry shirts under the label "Schwarze Rose®" (Black Rose) - made from the material Diolen Star®.

Unlike pure cotton, the fibres in the blend developed by the Wuppertal-based Glanzstoff AG (today Enka International GmbH & Co. KG) only swell slightly in water, so that the drying process doesn't produce wrinkles. Since the shirts with the embroidered black rose are also much more comfortable than nylon shirts, they quickly become a mainstay in men's wardrobes.

In the early 1980s, cotton shirts also become more low-maintenance: The hollows in the cellulose molecules are filled to permanently prevent swelling in water. As a side effect, the cotton fabric acquires a nice sheen, a softer hand, and it dries more quickly.

If a few small wrinkles do develop after washing and drying, the natural body heat and moisture will smooth them out. And if you just cannot do without the hot iron, you will be happy about the time you save: For a perfectly well-groomed look, the ironing time goes down from 10 to a maximum of three minutes.

Drip-dry shirts

Good to know:

Many drip-dry shirts comply with the strict criteria of the Oeko-Tex Standard 100 for textiles tested for harmful substances and are eligible to be labeled accordingly.

Answer the following questions.

1. What are cotton shirts?

2. What did the company begin marketing?
3. What label did the shirts have?
4. What properties did the fibres in the blend have?
5. Did the drying produce wrinkles?
6. What embroidery did the shirts have?
7. What side effect does the cotton fabric have?
8. Does it dry quickly?
9. Do these shirts need ironing?

6 FANTASTIC ELASTIC

Study the meanings of the words:
garment – одежда;
indispensable – необходимый;
incorporate – включать в состав;
length – длина;
snap (back) – возвращаться в исходное состояние;
stiff – жесткий, неэластичный;
loose – свободный;
cluster – пучок, гроздь;
pull – тянуть;
elongate – удлинять;
relax – расслаблять(ся);
ball up – свивать(ся), собирать(ся).

Dry or wet - in bathing suits, they create a tight fit, while offering more comfort in outer garments: whenever a high level of elasticity is required, elastic fibres have become indispensable.

The way to this wearing comfort is paved by German chemist Otto Bayer in 1937, when he invents polyurethanes. Using these polymers, the American chemist Joseph Shivers manages to produce the first so-called elastane fibre in 1959, which is still known today under the brand name of Lycra®. He develops a method to mass-produce the fibre consisting of linear macro-molecules with incorporated polyurethane. In Germany, Bayer AG begins production of Dorlastan® in 1962, which has similar properties.

Both fibres can be stretched to seven times their original length and can snap back immediately. The reason lies in the structure of the fibre: The molecules of elastane have both stiff and loose, rubber-like segments. The stiff segments come together vertically, creating fibres. The soft, loose segments are present as clusters within the fibre. If the fibre is pulled, the clusters are stretched, so that the fibre elongates. Once the fibre is relaxed again, it returns to its original state and the loose segments ball up into clusters again.

Elastic fibres

Good to know:

Less than 1 % of the world’s crude oil is used to produce man-made fibres. These are mainly used in technical applications.

Answer the following questions.

1. What do elastic fibres offer?
2. What did the German chemist invent?
3. What did the American chemist produce?
4. What name does this fibre have today?
5. What did the American chemist develop?
6. What stretching does this fibre have?
7. What is the reason of this stretching?

7 STRONG TOGETHER

Study the meanings of the words:
durable – прочный, длительный;
matrix – матрица;
malleable – тягучий;
saturate – насыщать;
weight – вес;
stiff – неэластичный, жесткий;
balsa – бальза;
glide – скользить.

The whole is more durable than its parts: Due to the incorporation of textile fibres in a plastic matrix, it is possible to produce very durable and lightweight parts. Nobel Laureate Adolf von Bayer was the pioneer of modern fibre-reinforced plastics. In 1872, he described the polycondensation of phenol and formaldehyde into a malleable plastic material, which gave Belgian chemist Leo Hendrik Baekeland the idea to produce Bakelite®, a man-made material patented in 1907.

When the British fighter "Gordon Aerolite Spitfire" went into construction in 1940, the principles of lightweight construction was first used for large-scale production: Plastic-saturated flax fibres help reduce weight - while still making for very stiff and strong building components. In 1954, plastic reinforced with glass fibres (GFRP) are used for building the "Phoenix" at the University of Stuttgart, instead of balsa wood that had previously been used for glider construction.

Today, the materials most used in vehicle and aircraft construction are compounds reinforced with carbon fibres (CRP). CRP have four times more tensile strength than steel alloys - at one fourth of the weight. In addition, their dimensions

change minimally, even at extreme temperature changes. The Fibre Institute Bremen (Germany) is a partner in the development of high performance composite materials for aircraft construction. 50 percent of the parts for the Airbus A350 already consist of CRP. In the fields of electrical engineering and architecture, compound materials are very popular as well.

Fibre-reinforced plastics

Good to know:

Vehicle bodies made from FRP go through a tough durability test in Formula One racing cars and other vehicles, before they are used to save weight in standard cars such as the Mercedes-Benz SLR.

Answer the following questions.

1. Who was the pioneer of fibre – reinforced plastics?
2. What did he suggest?
3. Who had the idea to produce Bakelite?
4. Where were these principles used?
5. What does the plastic-saturated flax help?
6. What properties do these components have?
7. Where are these materials most used?
8. Do their dimensions change?
9. How are compounds reinforced?
10. Where are composite materials used?

8 TAKING THE HEAT

Study the meanings of the words:
fire-resistant – огнестойкий, несгораемый;
vinegar – уксус;
alum – квасцы;
variety – множество;
flame-retardant – огнестойкий;
felt – войлок;
spark – искра.

Since ancient times, people have been trying to make cellulose fibre such as wood and fabrics more fire-resistant with the help of wine vinegar and alum.

After World War I, the brothers Gerhard and Floris Rost in Schiittorf (Germany) were among the first to use a variety of substances to produce flame-retardant fabrics at an industrial scale. The first customers of G. Schiimer GmbH & Co. KG are steelworkers from the nearby Ruhr, who need more than wool felt and

thick cotton fabrics to protect themselves from the sparks of their smelters that can reach temperatures of almost 1,500 °C.

In the course of the following decades more efficient and durable fire protection equipment based on water-soluble salts, chlorine and phosphorus compounds, as well as metal salt complexes, is developed for personal protective equipment (PPE) for different professions in which people deal with open flames.

As an alternative to fibres and fabrics finished with flame-retardants, Stephanie Louise Kwolek of the US company Dupont develops aramid fibres (aromatic polyamides), which are extremely heat- and flame-resistant due to their chemical structure. The innovation, marketed under the label Kevlar™, is very stable, has great impact strength and ultimate elongation. Today, the material is used in PPE, protecting people from fire, cuts, shots and stabs. In the field of interior design, fabrics made from flame-resistant polyester fibres have been widely used since the 1980s.

Flame-retardant protective clothing

Good to know:

In the US, about 100 firefighters die of cardiovascular failure or heatstroke on the job each year. PPE for these professionals not only has to protect them from external influences, but must offer an optimized level of wearing comfort, e.g. combining different materials with membranes 19 etc.

Answer the following questions.

1. What fabrics did people try to make?
2. Why do steelworkers need fire-resistant fabrics?
3. What compound was developed?
4. What professions did new fabrics need?
5. What fibres did the US company Dupont develop?
6. Why do they have heat- and flame-resistant properties?
7. Where is this material used now?
8. What does it protect from?

9 REVOLUTION IN THE WASHHOUSE

Study the meanings of the words:
further – содействовать;
propose – предлагать;
detergent – моющее средство;
laundry – прачечная;
miracle – чудо;
goal – цель;
rinsing – полоскание;

recognize – признавать.

"There is no law that has done as much to further the emancipation of women as the invention of the washing machine," French sociologists have proposed.

Combined with the first self-acting detergents, the twin-tubs of the early 20th century do indeed spark a revolution in the washhouses. For millions of housewives, the weekly laundry day loses at least part of its horror.

In 1956, the first automatic washing machine made by Miele & Cie. KG also moves the laundry from the basement into the kitchen - the centre of modern family life. When prices go down due to mass production in the mid-1960's, while the economic miracle gives people sufficient financial means, washing machines find their way into many German households.

Engineers in the 1960s already achieve the goal of a fully automatic washing process, in which all cycles from washing to rinsing to spin-drying are automatically controlled by the machine.

Today, engineers and chemists are working on developing washing processes that conserve energy and water in order to be more eco-friendly. In addition, they create cycles for delicate fibres and textiles or devices that are able to recognize the type of laundry and its level of soiling.

Fully automatic washing machine

Good to know:

Compared to the 1970s, washing machines in 2000 consumed about 70 % less water and 50 % less power.

Answer the following questions.

1. What invention furthered the emancipation of women?
2. What sparked a revolution in the washhouses?
3. When did the first automatic washing machine appear?
4. What is the centre of modern family life?
5. What gave financial means to the people?
6. What goal did the engineers achieve?
7. What processes do engineers work now at?
8. What do cycles recognize?

10 HAPPY LANDING!

Study the meanings of the words:
launch – запускать;
wether – валух (баран);
rooster – петух;
drake – селезень;

manned – управляемый человеком, пилотируемый;
durable – прочный, износостойкий;
stein – глиняная кружка;
template – лекало, шаблон;
panel – секция, вставка;
plotter – плоттер, графопостроитель.

The dream of flying is as old as mankind. It first comes true in June of 1783: The Montgolfier brothers, both paper manufacturers, launch a linen tethered balloon with a capacity of 500 m3, which is lined with thin paper and receives its lift from straw and sheep's wool burned in a tin pan underneath the balloon.

That same summer, the pioneers of aviation launch other balloons, one of them with passengers: a wether, a rooster and a drake. In November 1783, manned balloon aviation is born: Jean-Francois Pilatre de Rozier and Frangois Laurent, Marquis d'Arlandes, go up for 25 minutes in a straw-fired 'Montgolfiere' made from silk and paper, travelling above Paris for 10 km.

To this day, hot-air balloons have lost none of their fascination. However, modern balloons are made from ultra-light nylon fabrics laminated with polyurethane (approx. 60 g/m2), which are extremely air-tight and durable. The shapes of the balloons are now created with special 3D software, and anything is possible - from sneakers to beer steins. Templates are created to cut out the fabric panels and precision-printed with large plotters - at a volume of 1,200 m3, a balloon can consist of more than 600 of these nylon segments, each more than 40 m long.

Hot-air balloon

Good to know:

The volume of hot-air balloons is categorized in different classes. They range from 400 up to 12,000 m^3 – which is equivalent to a transport capacity from one to 19 passengers.

Answer the following questions.

1. When was the first balloon launched?
2. Who launched the balloon?
3. What was the capacity of the balloon?
4. Who were the first passengers?
5. When was manned balloon aviation born?
6. Are hot-air balloons popular nowadays?
7. What are modern balloons made from?
8. How are the shapes of the balloons created?
9. A modern balloon consists of less than 60 segments, doesn’t it?
10. What is the possible length of these segments?

11 INTELLIGENT TEXTILES

Study the meanings of the words:
drip-dry – быстросохнущая ткань;
integrated – встроенный;
heated – утепленный, с подогревом;
conductive – проводящий;
yarn – пряжа;
kink – скручивание.

In the new millennium, garments do not just support their wearers in a passive way by being comfortable or drip-dry. With their integrated electronic elements, shirts and other textiles have also become intelligent and interactive.

In Germany, the Thuringian Institute of Textile Research (Textilforschungsinstituts Thiiringen-Vogtland e.V., TITV) is one of the pioneers in the field of Smart Clothes. In 2005, scientists at the institute join forces with WarmX GmbH to create heated underwear, which has become very popular with winter sports enthusiasts. The necessary power is supplied by coats with flexible solar cells on the shoulders. So-called "GPS eyes" in garments transmit exact coordinates to locate people - including real-time localization in buildings.

A ski glove with an integrated flexible keyboard and Bluetooth connection was meant as a gift for a mobile-phone-loving manager, but it generated such a huge media response that Texsys GmbH teamed up with glove manufacturer Swany Europe GmbH to produce and market the innovative product for the average consumer in 2009.

Conductive yarns make these and future innovations possible. They are flexible, kink-resistant, washable and suitable for processing with regular textile machines. They can be made into power and data transmitters, as well as sensors, electrodes or luminous textiles.

I-wear

Good to know:

Garments with integrated sensors to monitor vital functions (heartbeat, breathing), like this baby bodysuit from the Institute of Textile Research and Process Engineering (Institut für Textil-und Verfahrenstechnik, ITV), promise more safety and additional freedom even for risk patients and elderly people.

Answer the following questions.

1. What are the functions of modern garments?
2. What does “intelligent” textile mean?
3. What institution deals with Smart clothes?
4. What companies joined to create heated underwear?
5. What is the function of “GPS eyes”,

6. Does a ski glove with an integrated flexible keyboard and Bluetooth connection exist?
7. Did the gloves become popular?
8. What are the main features of conductive yarns?

12 INTO THE BLUE

Study the meanings of the words:
sturdy – прочный;
tarpaulin – брезент;
procure – добывать, приобретать;
rivet – заклепка;
sandblasting – пескоструйная обработка;
apparel – одежда, швейные изделия.

In 1872, the German immigrant Levi Strauss produces the first sturdy work clothes for Californian gold diggers, first from brown tarpaulin, then from indigo-dyed cotton fabric (denim). He has no idea that his trousers will become one of the world's great fashion classics - jeans.

The first jeans outside of the US are made in 1948, by L Hermann Kleiderfabrik (today MUSTANG Jeans GmbH). The cutting pattern is taken from a G.I. for 6 bottles of schnapps. The first European jeans for women are produced in Künzelsauin 1953. The so-called “Girl Camping Trousers” have a modest side zipper.

A classic in every denim collection is a pair of blue jeans with 5 pockets, striking flat-felled seams and rivets. With the help of modern washing and finishing techniques (e.g. sandblasting), the fashion industry creates new looks ranging from overdyed to used.

Even evergreen denim apparel is now being created with high-tech elements: Via integrated, flexible solar cells, a prototype jacket by Bogner Jeans (MUSTANG Group), developed in the research project "Solartex", provides an independent power source for electronic components such as MP3 players or mobile phones.

Jeans

Good to know:

When designing the cuts, Levi Strauss was inspired by cotton trousers from the area around the Italian city of Genoa. The term “jeans” derived from the American colloquial pronunciation of “Genes”, the French name for the city.

Answer the following questions.
1. Who produced the first jeans?
2. Why did the gold diggers like jeans?

3. What is the modern name for L.Herrmann Kleiderfabrik?
4. When were the first European jeans made?
5. What was the name of the jeans?
6. What features should classic jeans have?
7. Are high-tech elements used in denim garments?
8. What company developed a denim jacket with flexible solar cells?

13 GONE WITH THE WIND

Study the meanings of the words:
windjammer – парусник;
crude – сырой;
propulsion – продвижение, импульс;
relieve – облегчить (нагрузку);
foil – фольга, пленка;
mast – мачта;
altitude – высота;
thrust – напор, давление, противодействующая сила;
tractive – тяговый;
tensile – эластичный.

The Last cargo windjammer, "Padua" (now: Krusenstern) is launched in 1926. About 80 years later - given the skyrocketing crude oil prices - the wind enjoys an unexpected renaissance as a means of propulsion in shipping.

In 2008, the heavy cargo ship "MS Beluga SkySails" with a length of 133 m begins its virgin voyage to South America, equipped with a kite propulsion system developed by the industrial engineer Stephan Wrage.

The SkySails System® is used as an additional propulsion system to relieve the main engines at sea. It consists of three simple components: a foil kite on a rope, a starting and landing system and a control system for automatic operation. Unlike conventional textile sail systems with the sails attached to the mast, the kite of the SkySails System® has an area of 150 to 600 m2 and is connected to the ship by a rope, which means that it can be brought up to the altitude with the strongest wind thrust.

Even the smallest SkySails kite of 160 m2 has a tractive force of up to 16 tons. In order to be able to withstand such forces, the kite consists of a specially developed, extremely tearproof textile composite based on polyamide. The rope is made from the very strong polyethylene fibre (PE) Dyneema®. Given the same weight, the fibre possesses 15 times more tensile strength than steel.

Kite propulsion system

Good to know:

On average, the SkySails System can cut fuel costs by 10 to 35 % per year. Under the best weather conditions, up to 50 % of fuel can be saved – for the “MS Beluga SkySails”, this would mean three to four tons of fuel per day.

Answer the following questions.

1. When was the last cargo windjammer “Padua” launched?
2. What is the length of the ship “MS Beluga SkySails”?
3. What is it equipped with?
4. Who developed a kite propulsion system?
5. What is the SkySails System used for?
6. What does it consist of?
7. What is the difference b/n conventional textile sail systems and the kite of … SkySails System?
8. What is a tractive force of the smallest SkySails kite?

14 DEATH OF THE OILSKIN

Study the meanings of the words:
insurmountable – непреодолимый;
sheath – оболочка;
sieve – решето;
evaporate – испаряться;
gaseous – газообразный;
coveralls – рабочий комбинезон, спецодежда.

Breathability - until the 1970s, this property seemed to be unattainable in protective outdoor apparel. The usual oilskin jackets, made from oiled or PVC-laminated cotton, keep away the rain, but their sealed surface is also an insurmountable obstacle for sweat.

So it is no wonder that the passionate yachtsman and chemist Bob Gore becomes very interested in one of his company's new discoveries. In an attempt to cut down on the use of Teflon material (PTFE) in cable insulation, the insulation sheaths were stretched. Under the electron microscope, researchers discovered micropores in the material that had a diameter of 0.2 to 0.5 urn. The "sieve-like" Teflon membrane could not be used for cable insulation. But Bob Gore, a clever man, recognized the material's potential as a selective system, in which drops of water are unable to enter through the membrane pores, because they are about 500 times smaller. Sweat evaporating from the body, on the other hand, is gaseous, and thus able to pass through the pores.

As a first test, Teflon membranes are laminated onto fabric, which is used to

make coveralls for sailors. Friends of the inventor are pleased with the garments' much higher comfort level. In 1978, apparel made from Gore-Tex® is sold in shops, revolutionizing the market for weather- and waterproof clothing, especially in the field of personal protective equipment (PPE) for rescue workers and firefighters 03.

Membranes

Good to know:

Sympatex, a membrane system introduced in 1986, consists of a pore-free, waterproof polyester membrane with integrated oxygen bridges as hydrophilic molecule blocks. They absorb the steam molecules of sweat, transport them through the membrane and release them on the outside.

Answer the following questions.

1. Was it possible to attain breathability in protective outdoor apparel in 1960s?
2. What's Bob Gore's job?
3. What is the role of Bob Gore in the development of a new material?
4. Why is it called a selective system?
5. Could the 'sieve-like' Teflon membrane be used for cable insulation?
6. What was this material used for?
7. Were sailors pleased with the coveralls with Teflon membranes?
8. What apparel revolutionized the market for weather- and waterproof clothing?
9. What is Gore-Tex?

15 THE GOLDEN FLEECE

Study the meanings of the words:
fleece – руно;
treasure – сокровище;
leather – кожа;
nonwoven – нетканый;
align – выстраивать в линию;
enforce – реализовывать;
indispensable – необходимый;
apparel – одежда;
multitude – масса;
enbed – создавать.

In Greek mythology, the Golden Fleece is the fleece of the winged, talking ram Chrysomallos, a rare treasure coveted by many and hunted by Jason and the Argonauts.

In 1935, Carl Ludwig Nottebohm writes a letter to Carl Freudenberg GmbH, offering special treasure as well: "A process using latex milk and fibres to produce a

novel material - artificial leather." In 1948, his ongoing research results in a completely new material, marketed as Vlieseline® and Vileda®, that becomes the foundation of an entirely new industry: nonwoven fabric.

Unlike the ancient model, this fabric, consisting of aligned or crosslayed fibres, is not made of wool but of man-made fibres. In 1965, Ludwig Hartmann enforces the application of nonwovens by inventing a continuous production method, with which nonwovens made from thermoplastic granulates (polyester, polypropylene) can be produced in one processing step.

Due to their mechanical strength, nonwovens have become a indispensible staple in the apparel, medical and automotive industries. New material combinations and processing methods offer a multitude of additional functions: Evolon®, for example, has embedded micro-fibre elements creating a particularly dense textile structure with a large surface.

Nonwovens

Good to know:

Despite its appearance, fleece, a popular fabric choice for outdoor and athletic apparel, is a type of woven imitation fur made from polyester – and thus not a nonwoven fabric!

Answer the following questions.

1. What treasure does the Greek mythology talk about?
2. Who hunted this treasure?
3. What did Nottebohm offer?
4. What raw materials did he want to use?
5. What materials did they develop?
6. What industry did they found?
7. What did Hartmann invent?
8. What does this fabric consist of?
9. Where can nonwovens be used?
10. What do new material combinations offer?

16 ONE FOR ALL

Study the meanings of the words:
bond – соединение;
chain – цепочка;
stockings – чулки;
crease – мять(ся).

The development of the first polyamide textile fibres in the 1930s marks the

beginning of a new textile era: Apart from the well-known natural fibres, new materials are available now, featuring specifically adjustable properties.

Polyamides are macro-molecules in which the monomers are connected by amide or peptide bonds. Chemically speaking, hair, wool and silk are polyamides as well - but they have much shorter molecule chains than their man-made equivalents.

The first to produce these was Dr. Wallace Hume Carothers, on February 28, 1935. Under the brand name of Nylon® (Polyamide PA 6.6), the new fibre is first used in 1938 as a cheap alternative to natural silk for the production of women's stockings.

Meanwhile in Berlin, Prof. Dr. Paul Schlack develops a similar macro-molecule with comparable chemical and physical properties, called Perlon® (Polyamide PA 6). The production method, however, differs vastly from the US version.

Polyamide fibres are very abrasion-resistant, elastic, have high bending strength, do not crease much, are quick-drying and hold up well against chemicals, which makes them the perfect material for well-fitting and security in the categories swimwear, athletic apparel, hosiery, parachutes, airbags and even car tyres.

Polyamide

Good to know:

With 50 litres of fuel, you can drive 500 km or produce 1,000 pairs of polyamide tights weighing 25 g each.

Answer the following questions.

1. When were the first polyamide fibres developed?
2. What did it mark?
3. What properties do they have?
4. What natural materials are polyamides?
5. When was the first fibre produced?
6. What was its name?
7. Where was it used?
8. What material was produced in Berlin?
9. What properties do polyamides have?
10. Where are they used?
11. What consumer categories are they used in?

17 LATHER, RINSE, CARE

Study the meanings of the words:

entrust – поручать;

care – уход;

garment – одежда;
esteem – уважать;
turpentine – скипидар;
greasy – жирный;
stain – пятно;
laundry – прачечная;
dirt – грязь;
rinsing – полоскание.

Already the citizens of Rome entrust the care of their garments to esteemed specialists. In later centuries, the value placed on clean clothes - and personal hygiene in general - varies rather drastically.

Professional textile care comes to new honours in 1825: The French master dyer Jolly Belin first uses turpentine oil to remove greasy stains, thus founding a flourishing new industry -chemical laundry. Modern dry-cleaners remove stains on water-sensitive fabrics in closed systems using perchlorethylene, hydrocarbon, and lately liquid C02 as solvents.

Traditional laundries, on the other hand, remove dirt and stains from textiles using water and detergents. In 1950, the reverse-flow washing system changes the cleaning industry completely: Erich Sulzmann connects 12 washing machines so that the laundry bath flows from one to the next - the same water, the so-called washing solvent, is first used for rinsing, then for bleaching, washing and, in the last round, for pre-washing. Water and energy consumption are reduced to a third. The laundry conveyor (1965) results in the development of the now usual cycle washing systems, combining the reverse flow principle with a clever laundry transport system.

Professional Garment care

Good to know:

The quantum leap in terms of conserving water came in 2007 with the introduction of the PowerTransJET (shown here) made by Herbert Kannengiesser GmbH. In this laundry system, much of the washing solvent is removed from the textiles before rinsing. Thus water consumption is reduced from 5-8 litres to about 3 litres per kg.

Answer the following questions.

1. How did the citizens of Rome clean their garments?
2. When did professional textile care come to new honours?
3. How did the French dyer Jolly Belin remove greasy stains?
4. How do modern dry-cleaners remove stains?
5. What system did the cleaning industry use in 1950?
6. Did it reduce water and energy consumption?

18 MADE TO MEASURE

Study the meanings of the words:
customer – заказчик;
convince – убеждать;
seamstress – швея;
chart – диаграмма;
vary – изменяться;
gather – собирать;
study – изучение.

Garments in standard sizes, produced for anonymous customers at a fixed price become available in Germany in 1839. The idea of "off-the-rack" clothes convinces 20-year-old Rudolph Hertzog, who opens a clothing shop with mail-order service in Berlin's district of Alt-Colin.

At first the garments are hand-made by seamstresses in factories or at home. With the introduction of the first sewing machines H3 in the mid-19th century, mass production of clothing becomes the standard.

Garment production is based on measurement charts, which vary among manufacturers, sometimes considerably. The data for the charts are gathered in sporadic measuring campaigns and do not reflect the actual body measurements and proportions of the general public.

In 1957, The Hohenstein Institutes in Germany conduct the first representative measurement study with 8,000 women. The resulting measurements become the basis for standardized measurement charts and clothes sizes that serve as orientation for consumers.

In 2007/2008, 12,000 women, men and children are measured with a 3D scanner instead of traditional measuring tapes. A contactless laser records body measurements electronically in 12 seconds.

Ready-to-wear clothes

Good to know:

The future of ready-to-wear apparel is here: Based on the measurements of a 3D scanner, an “electronic twin” of the wearer can be created. It is used to produce customized garments in an industrial setting (industrial custom clothing). The customer avatar can also take over the time-consuming task of trying on clothes in a “virtual changing room”, either in a boutique or on the customer’s home computer.

Answer the following questions.

1. When did garments in standard sizes become available?
2. What idea did Hertzog have?
3. What shop did he open?
4. How were the garments made at first?

5. When were the sewing machines introduced?
6. What is garment production based on?
7. Where were the data for charts gathered?
8. When was the first measurement study conducted?
9. What is used for measuring bodies nowadays?

19 FLYING NEEDLES

Study the meanings of the words:
stitch – снежок;
sewing machine – швейная машина;
establish – создать;
ready-to-wear – готовая одежда;
weld – сваривать;
seal – изоляция;
waterproof – водонепроницаемый;
close-fitting – прилегающий;
glue – клей;
lingerie – женское белье;
splicer – склеечный пресс.

With 250 firm stitches per minute, the first fully functional double-stitch sewing machine, developed by Elias Howe, wins in a US contest in 1846 against experienced seamstresses, who do manage to make 50 stitches per minute.

While the inventor is unable to enjoy any commercial success, his countryman Isaac Singer offers his copies of the machine at a uniquely low price and establishes a clever financing system, which becomes the foundation of the triumphant progress of the sewing machine. Soon, the machine becomes an indispensible tool in many US and European households, while also facilitating mass production of ready-to-wear clothing B3 for the first time.

In recent years, needle and thread have met with new competition: Modern membrane materials are often welded together with hot air, lasers or ultrasound - these methods create seams that do not have to be sealed in order to be waterproof.

In 1999, Triumph International AG revolutionizes the market for close-fitting garments with their glued lingerie seams. The garment parts are connected with very flat, barely visible seams created with a heat-bonding method using special films and splicers.

Sewing machine

Good to know:

Modern sewing machines or sewing automats for the apparel industry are electronic and mechanical miracles, capable of maximum productivity with about

4,000 stitches per minute.

Answer the following questions.
1. What did Howe develop?
2. How many stitches did it make per minute?
3. Could the inventor use his success?
4. Who offered his copies?
5. What system did Singer establish?
6. What did the machine facilitate?
7. What methods are applies today?
8. What seams were suggested in 1999?
9. How do these seams look?
10. How are they created?

20 MIRACULOUS MALIMO

Study the meanings of the words:
fabric – ткань;
layer – слой;
loose – свободный;
row – ряд.

In post-war Germany, plagued by hardships, the textile engineer Heinrich Mauersberger watches his wife as she repairs clothes with her sewing machine. He has a splendid idea: He wants to produce thread fabrics that are not woven but sewn using a special technique.

On February 3, 1949, Mauersberger applies for a patent for the "production method of stitch-bonded fabric". Layers of loose threads or fibres are bonded by being overstitched with many parallel rows of knit stitches, which makes this method much faster than regular weaving or knitting techniques. Different fibres can be mixed together to create specific bounded structures.

MALIMO® machines are first produced in 1957 in Karl-Marx-Stadt (called Chemnitz today). Here, the MALIMO® technology is developed and refined to the present day. Apart from the technically refined MALIMO® process, particularly the methods of stitch bonding by sewing or knitting fibre layers are economically important. That means most elaborate threading processes can be eliminated.

Many technical textiles are produced with the processing variations of MALIVLIES, MALIWATT, KUNIT and MULTIKNIT. They are used as textile carpet backing, decorative or lamination material in vehicle construction, as laminate carriers, cleaning cloths or geotextiles.

Stitch-bonding

Good to know:

The brand name MALIMO stands for Mauersberger Limbach Oberfrohna (Germany) and designates the machines as well as the finished textiles.

Answer the following questions.

1. What idea did Mauersberger have?
2. What patent did he apply for?
3. How are the new fabrics produced?
4. Can different fibres be used?
5. When was the first Malimo machine produced?
6. Is this method economically important?
7. What textiles can be produced by this method?
8. When can be these textiles used?

21 WITH FLYING COLOURS

Study the meanings of the words:
demand – спрос;
dye – краситель;
clergyman – священник;
remedy – лекарство;
purple – пурпур;
uncover – раскрыть;
far – смола;
resistant – устойчивый;
consumption – расход.

Inspired by the great demand from the rising textile industry in the early 19th century, researchers begin to look for synthetic alternatives to common natural dyes such as ochre and indigo.

Still, the first commercially used synthetic organic dye, mauveine or aniline purple, is developed by accident: In 1856, British clergyman William Perkin tries to synthesise the fever remedy quinine, but creates an intense purple dye instead.

In the following, more artificial dyes are produced, but only in 1862, German chemist Peter Gries uncovers the reaction mechanism that makes it possible to make so-called aniline dyes from coal tar components. The discovery becomes the foundation of the rising German chemical industry.

In 1901, Rene Bohn discovers a particularly colourfast blue dye (indanthrone), beginning a new era of textile dying: Now, textile finishers can use dyes that are mostly resistant to light, water and sweat.

In the late 20th century, researchers focus on optimising dyeing processes to conserve resources: Between 1992 and 2007, the average water consumption of the German textile finishing industry is reduced by approx. 25%.

Synthetic dyes

Good to know:

The German Textile Research Centre North-West (Deutsches Textilforschungszentrum Nord-West, DTNW) developed a dyeing process that does not use water as a carrier – instead, this very eco-friendly process applies dye with supercritical CO_2.

Answer the following questions.

1. How did the textile industry develop in the early 19th century?
2. What did the researchers look for?
3. When was the first synthetic organic dye developed?
4. What did Perkin invent?
5. What did German chemist uncover?
6. What did this invention make possible?
7. What did Rene Bohn discover?
8. Was it an important invention?
9. What dyes could be produced?
10. What did researchers focus on in the late 20th?

22 THE INCREDIBLE LIGHTNESS OF STONE

Study the meanings of the words:
reinforce – усиливать;
concrete – бетон;
strength – прочность;
scarce – едва;
rope – веревка;
bundle – пучок;
corrodible – подверженный коррозии;
pedestrian – пешеход.

Every year, about 6 million tons of steel are used as reinforcement material in Germany, ensuring that concrete parts are protected from losing their bearing strength and breaking under tensile stress (e.g. during transport). In order to cut down on the use of this scarce and thus expensive raw material, scientists at the Saxon Textile Research Institute (Sachsisches Textilforschungsinstitut e.V., STFI) in Chemnitz developed a method in 1982, which uses synthetic edge cuttings - a mass by-product

of textile production - to reinforce concrete. The Kemafil® reinforcement ropes still stabilize concrete components in road construction and other areas.

In the early 1990s, scientists at Dresden Technical University develop a lightweight, well formable textile concrete. With the stitch-bonding technique 133, fibre bundles, so-called ravings, are made into multi-axial mats, which are then incorporated in layers of a fine concrete matrix. Since the textile fibres are not corrodible, they can be used in much thinner layers than ferro-concrete, absorbing much more stress than regular concrete constructions.

In existing structures, textile-reinforced concrete is mainly used for strengthening, since the supporting layer is just a few millimetres thick, the appearance of the structure remains unchanged. The composite material is also used in the construction of new structures, such as facades or pedestrian and bicycle bridges, as shown here, which can be laid out in particularly fine and delicate designs.

Textile-reinforced concrete

Good to know:

The world’s first textile-reinforced concrete bridge, developed by scientists at Dresden Technical University, stand on the premises of the Saxonian Horticultural Exhibition 2006 in Oschatz, spanning the small Dőllnitz river.

Answer the following questions.

1. What material is used as reinforcement material?
2. What does it protect from?
3. Why did the scientists develop a new method?
4. What was it used for?
5. What is synthetic edge cutting?
6. Why are the ropes important?
7. What concrete die did the scientists invent?
8. How are the fibre bundles and the mats used?
9. What is the textile-reinforced concrete used for?
10. Where is it used?

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