

Makhzuna Shoyimqulova

English on Serving Technological Processes

Tutorial



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Imprint

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MINISTRY OF HIGHER AND SECONDARY SPECIALIZED EDUCATION OF THE REPUBLIC OF UZBEKISTAN

BUKHARA ENGINEERING - TECHNOLOGICAL INSTITUTE "FOREIGN LANGUAGES" department

Shoyimqulova M.SH.



on Serving Technological Processes



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Bukhara 2021

Serving Technological Processes.

The textbook is intended for the development of speech skills in the English language among students studying in the specialty "5321500-Serving Technological Processes". The publication consists of four sections, each of which contains texts for study and introductory reading and tasks to check the reading (Comprehension); exercises to expand and consolidate active vocabulary general and professional plan (Vocabulary; Discussion); exercises based on professional vocabulary section tasks, aimed at developing students' written communication skills (Writing). The manual includes a glossary as well as additional reading texts. Complies with the current requirements of the Federal State educational standard of secondary vocational education and professional requirements. For students studying in the specialty " Serving Technological Processes " and mastered the basic English course (level B1-B2 on the CEFR scale).

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Unit 1. Lesson 1. Characteristics of technology

Pre-reading comprehension	n: Active vocabulary
---------------------------	----------------------

Significantly	challenge
prehistoric discovery	by-products
development of weapons	ethical
sufficient	disagreements
explore space	transhumanism
affected	indicate
implementations	restricted
surroundings	primates



Text: Characteristics of technology.



productivity, a term originally applied only to machines, and the challenge of traditional norms. Philosophical debates have arisen over the present and future use of technology in society, with disagreements over whether technology improves the human condition or worsens it. Neo-Luddism, anarchoprimitivism, and similar movements criticize the pervasiveness of technology in the modern world, opining that it harms the environment and alienates people; proponents of ideologies such as transhumanism and techno-progressivism view continued technological progress as beneficial to society and the human condition. Indeed, until recently, it was believed that the development of technology was restricted only to human beings, but recent scientific studies indicate that other primates and certain dolphin communities have developed simple tools and learned to pass their knowledge to other generations.

General understanding:

1. What is technology?

2. What had helped humans in travelling in and controlling their environment?

3. When do people begin to communicate with each other on distance?

4. Has technology allowed the rise of a leisure class?

Task 1. Choose the correct answer.





on the box

b) down 6. The hammer is a) in the box b)

Task 2. Methodowy mes Listening comprehension: Technology

technology? Would we still be living in caves? What Probably. I think there are two technology. The kinds before and after computers. When we think about technology before computers. it . It was all mechanical. Things like steam trains and fridges. At the time, that technology. But, today's technology is really cutting edge. It's the kind of technology that soon as it hits the shelves. I love this, It's so exciting seeing it all happen. I love technology we'll have in It's like buying technology the future, and then buy from science fiction movies. I'd love to live to be 200 so I can see what technology

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00		Write th name u	he correct 18. mouse nder the 19. Printer 20. Loud speal
8		1. Mem 2. PDA 3. CD n	bry card 21. Bluetooth headset laver 22. wrist watch
	-1	4. MP3 5. Stered 6. Micro	player 23. Web camera 24. Camera 25. Joystick
20		7. Mobi 8. Steeri 9. Table	t phone 26. Television 27.Cordless phone
-		0. Dict 11. Vide 12. Fax 13 Grs	aphone 28. Headphone co camera 29. Kitchen robot 30. Mixer
63	V 2.	14. Lapt 15. 3D g 16. e-bo	sop 31. Gamepad glasses 32. Gameboy ok 33. Radio
T		What about	35. Pen drive
ow use them in ne words to con . My Imost empty. I o ome cheese and . I think I'd like	context, choose of uplete the sentence inly have a few egg a bottle of beer in i to buy which can b of bread.	ne of appliances? Match the with their use. A. Freezer S. B. Cooker t. C. Dishwasher D. Iron E. Refrigirator prown F. Dryer G. Toaster H. Washing	2. you bake foo it 3. you press clo flat and remove wrinkles with it 4. you keep foo frozen with it 5. you wash you dishes in it 6. you heat foo with it using en
/an p to four pieces . Put the saucepa nd summer for the . Throw your we ady in about 20	an on the hree minutes. It clothes into the They should b minutes.	machine I. Vacuum clea J. Microwave K. Oven	aner 7. you dry cloth with it 8. you keep foo cold with it 9. you heat pots
/an p to four pieces . Put the saucepa nd summer for th . Throw your we eady in about 20 . Could you get te living room.	an on the hree minutes. It clothes into the They should b minutes. the	machine I. Vacuum cle J. Microwave K. Oven	aner 7. you dry cloth with it 8. you keep foo cold with it 9. you heat pots pans on it 10. you toast fo 11. you clean th

to keep until the party next week.

- 9. Ther's nothing like a ______ to make cleaning up after dinner easy. Speaking task: Answer the questions: WHAT DO YOU NEED IF YOU WANT TO ... 1. Take a picture 2. Record some image _____ 3. Listen to music 4. Type on your computer 5. Control the cursor without keying 6. Store digital information 7. Control your video games 8. Send scanner printed material 9. Play games in a handheld console 10. Make or recive telephone calls 11. Scan images or printed text to convert it to a digital image 12. Answer someone calling you while driving 13. Cook, bake, defrost, and heat 14. Catching up on news, soaps, matches and sitcoms 15. Determine your vehicle's current position and location and be guided in your way ahead
- 16. Know the time

The World of Technology

Task 1. Match these words to the pictures: plasma

television/cassette/telephone/compact disc/cell phone/MP3 player/digital camera/remote control/audio system



Task 2. Read the clues and find the electronic gadget.

a. It is an optical disc used to store digital data.	
You can make and receive telephone calls everywhere with it.	_
This device makes a loud sound at a specific time.	
You can listen to music everywhere using your	
You can switch on the TV, or change the channel with it	_

Task 3. Classify these adjectives:

popular/big/modern/new/valuable/light/heavy/old/expensive/cheap/ antigue/fashionale/small /enourmous/

Long adjectives	modern			
Short adjectives	new			

Task 4. Choose the right option

a. Cellphones are cheaper/more cheap than plazma televisions.

b. Compact discs are more good/ better than cassettes,

c. Digital cameras moderner/more modern than cassettes.

d. MP3 players are smaller/more small than audio systems.

e. Plasma televisions are expensiver/more expensive than telephones.

Task 5. Complete the sentences with these nouns (there are 3 extra words)

Screen/digital camera/Mp3 player/mouse/printer/website/speakers

a. You can take digital photos with a _____

b. Most computers can print colour photographs on a

c. You use a to select documents on a computer screen.

d. The NTVRC is a TV company. It has a at www. ntvr.gov,uz

e. You can play music on a laptop computer, but the are very small.

Task 6. Comparing gadgets. Look at the pictures. Then talk about the MP3

8

players. Examples: Cool is smaller than new age My music is the most



expensive MP3.

Reading task. a quiz: TECHNOLOGY AND YOU

Task 1. A new inventionis advertised on TV.

a. You want to buy it now.

b. You wait until a friend recommends it.

c. You're not interested.

Task 2. How much of your pocket money is spent on computer and

electronic games?

a. more than 50%

b. less than 50%

c. 0%

Task 3. You were given a new computer game for your last birthday.

a. You understood the game immediately. ow.

b. You read the instructions carefully before you played the game.

c. You didn't play the game because you don't like computer games.

Task 4. You are invited to join a chat room.

a. You think of a cool user name and password.

b. You find out more about the chat room.

c. You don't join.

Task 5. Which hi-tech items do you want to buy?

a. a computer, an MP4, a mobile phone and everything else in the shops.

b. a computer and a mobile phone.

c. a mobile phone - that's all you need.

KEY: Add up your points: a-5 points; b- 3 points; c- 1 point.

20-25 Points: Hi-tech: You love hi-tech items and computers. You are always ready to try something new

10-19 Points: Medium-tech: You enjoy new technology but you don't use it all the time. You won't buy a hi-tech item just because it's latest thing.

5-9 Points: No-tech: You think technology is boring. You rarely use the computer don't enjoy it.

Task: Complete the sentences

1. A no -tech person doesn't like	
2. A medium -tech person doesn't	
3. A hi -tech person ill always try	
4. Computers are importat to	

WHICH GROUP DO YOU THINK EACH OF THE FOLLOWING PEOPLE IS IN?

1. Jalil saves his pocket money and his birthday money to buy the latest computer.

2. Malika was given a new iPod for her birthday. She doesn't use it because she doesn't understand the instructions.

3. An MP4 player and a digital camera are included on Mubashira's mobile phone, but it hasn't got GPS. Mubashira wants a new phone.

4. Feruza believes computers make people lazy. She doesn't the computer for anything.

5. Dilora enjoys using the Internet but she thinks computer games and chat rooms are boring.

Answer the questions.

1. What is technology?

2. How do you think will technology improve the human condition or worsen it?

3. What would we do without technology?

Unit 1. Lesson 2. Definition and usage of technology

Pre-reading comprehension: Active vocabulary:



politicians	entity
technical education	mental and physical effort
	In this usage
scholars	solve real-world problems
reject	fulfill needs
more recently	satisfy wants
instrumental reason	available
broadly	

Text: Definition and usage of technology

The invention of the printing press made it possible for scientists and politicians to communicate their ideas with ease, leading to the Age of Enlightenment; an example of technology as a cultural force.

The use of the term "technology" has changed significantly over the last 200 years. Before the 20th century, the term was uncommon in English, and usually referred to the description or study of the useful arts. The term was often connected to technical education, as in the Massachusetts Institute of Technology (chartered in 1861). The term "technology" rose to prominence in the 20th century in connection with the Second Industrial Revolution. The term's meanings changed in the early 20th century when American social scientists, beginning with Thorstein Veblen, translated ideas from the German concept of Technik into "technology". In German and other European languages, a distinction exists between technik and technologie that is absent in English, which usually translates both terms as "technology". By the 1930s, "technology" referred not only to the study of the industrial arts but to the industrial arts themselves. In 1937, the American Sociologist Read Bain wrote that "technology includes all tools, machines, utensils, weapons, instruments, housing, clothing, communicating and transporting devices and the skills by which we produce and use them." Bain's definition remains common among

scholars today, especially social scientists. But equally prominent is the definition of technology as applied science, especially among scientists and engineers, although most social scientists who study technology reject this definition. More recently, scholars have borrowed from European philosophers of "technique" to extend the meaning of technology to various forms of instrumental reason, as in Foucault's work on technologies of the self (techniques de soi). Technology can be most broadly defined as the entities, both material and immaterial, created by the application of mental and physical effort in order to achieve some value. In this usage, technology refers to tools and machines that may be used to solve real-world problems. It is a far-reaching term that may include simple tools, such as a crowbar or wooden spoon, or more complex machines, such as a space station or particle accelerator. Tools and machines need not be material; virtual technology, such as computer software and business methods, fall under this definition of technology. W. Brian Arthur defines technology in a similarly broad way as "a means to fulfill a human purpose".

The word "technology" can also be used to refer to a collection of techniques. In this context, it is the current state of humanity's knowledge of how to combine resources to produce desired products, to solve problems, fulfill needs, or satisfy wants; it includes technical methods, skills, processes, techniques, tools and raw materials. When combined with another term, such as "medical technology" or "space technology", it refers to the state of the respective field's knowledge and tools. "State-of-the-art technology" refers to the high technology available to humanity in any field.

General understanding:

- 1. What was the technology term connected to?
- 2. How could Second Industrial Revolution influence to the technology?
- 3. What did write Read Bain about technology?

Task 1. Match the words and the pictures. adapter antenna bolts cable chisel nuts plug saw screws screwdriver spanner washers

Task 2. Match the words and the pictures.



1. copy machine 2. smart phone 3. karaoke set 4. A CD player 5. computer

6. webcam 7. USB pen 8. printer 9. tablet 10. laptop

Task 3. Find ten Technical things in the word search and Put the letters in the correct order.

R	L	T	A	B	16	E	T	1	T	eovpdryd
С	A	M	C	0	R	D	E	R	S	2 oevitnesli:
W	P	D	W	E	8	C	A	М	С	4 ebttlo
A	T	S	1	V	R	T	E	1	A	5 toclocuolr:
K.	0	N	M	0	В	1	L	E	N	- 6 pploto
Т	P	R	С	A	M	Ē	R	A	N	8 renrpit:
U	S	8	P	E	N	0	N	M	E	9 bnseup
R	P	R	1	N	T	E	R	P	R	10 aemwcb

Task 4. Find the odd word out.

computer - camera - laptop - tablet

calculator - printer - scanner - webcam

CD player - DVD player - MP3 player - copy machine

A webcam - camcorder - Play Station - camera

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television - printer - radio - DVD player

Task 4. Match: What are they?

1. Tablet

a) A machine that prints words from o computer.

2. PlayStation

b) A thing thot you use for taking photographs:

3. printer

c) A thing thot feeds its images in real time to a computer:

scanner
 MP3 player
 webcam

d) A mobile computer that is operated by touching the screen

- e) A portable media player that can store and play digital media
- 7. calculator
 8. television
 9. camera
- 10. laptop

f) A personal computer for mobile use:

g) A series of several video game consoles:

h) A machine like a box that shows moving pictures with sound:

i) A machine thot gives a picture of the inside of something.

j) An electronic instrument that odds, subtracts, multiplies and divídes

Task 5. Passive: Inventors and Inventions

A good or a bad invention?

Our lives (make)better every day thanks to inventions. But sometimes, inventions can make our lives worse. This (not use) according to the can happen when an invention 2 inventor's plan. For example, Alfred Nobel, a Swedish scientist, invented a strong explosive in 1867. It 3 (Call) dynamite and it revolutionized the world of engineering. After its invention, many bridges, tunnels and other structures 4 (build) with the help of dynamite. (also. use) to kill people in wars. This However, dynamite 5 upset Nobel. Before his death. Nobel decided to use the money from his famous invention to make the world a better place. A special fund 6 (starts in Nobel's name. Every year. Nobel prizes 7 (give) for extraordinary work in science, medicine, literature and the promotion of world peace.

Where Is the rice grown?

People usually think that rice 1 (grow) in Chine- But did you know that there's a place in Spain full of rice fields? They 2 (locate) In northcastern Spain on the banks of the Ebro Delta at the Piet Veil nature reserve. 300 tonnes of rice ³ (produce) each year. The first rice 4 (piano) here in 2003. Chemicals 5 (not use) in the fields before 2003 so the rice is organic. Lots of birds 6 (help) by the rice fields, including herons and flamingos. The rice 7 (buy) by many countries, including Germany. In 200V (give) an organic food award. the rice 8 How Is paper produced add - dry - introduce - invent - mix - not make - not need - produce use (x2)Paper 1 from wood. The fibres of wood from trees 2_____ with water until they becomes a soft wet pulp, which . This method of paper-making 4 3 in the 2nd century BC in China. However, early writing material 5 (always) from wood. In fact, the word paper comes from papyrus plants which 6 by the Egyptians to make a form of paper in 3.000 B C- When machines for- paper making 7_____ in the 19th century, paper became easy to afford. Today, one of the problems with the huge production of paper is that a chemical called chlorine 8 to make the paper white. "Recycling is important, because chlorine

9 and less energy 10 for recycled paper.

Listening comprehension:

Airplanes are amazing. How does something heavy get off the ground? I'm alwaysamazed at how the millions of different together. Travelling by airplane is always a

wonderful experience.	whether economy class is	
cramped and has no space.	like playing with	
entertainment system, espec	ally nowthey have all the latest movies.	
	airplane food. Many of my friends say	
	but I love it. I often ask the passenger next to me	if
can have the dessert or	want. The only thing I	
don'tlike about planes is tu	ulence. When the	
airplane	pockets, I always worry	
	once read that turbulence has	
	in airplane to crash.	

Answer the questions

What can you say about medical technology? Give your definition to the space technology.



Unit 1. Lesson 3. The distinction between science, engineering and technology

Pre-reading comprehension:

Active vocabulary

distinction between investigation enduring principles formal techniques goal-oriented process draw upon consequence of science electrical conductors purposes of research and reference relations between science and technology immediate wake articulation of philosophy essential new knowledge remain resist

Text: THE DISTINCTION BETWEEN SCIENCE, ENGINEERING AND TECHNOLOGY

The distinction between science, engineering and technology is not always clear. Science is the reasoned investigation or study of phenomena, aimed at discovering enduring principles among elements



of the phenomenal world by employing formal techniques such as the scientific method. Technologies are not usually exclusively products of science, because they have to satisfy requirements such as utility, usability and safety. Engineering is the goal-oriented process of designing and making tools and systems to exploit natural phenomena for practical human means, often (but not always) using results and techniques from science. The development of technology may draw upon many fields of knowledge, including scientific, engineering, mathematical, linguistic, and historical knowledge, to achieve some practical result.

Technology is often a consequence of science and engineering although technology as a human activity precedes the two fields. For example, science might study the flow of electrons in electrical conductors, by using already-existing tools and knowledge. This new-found knowledge may then be used by engineers to create new tools and machines, such as semiconductors, computers, and other forms of advanced technology. In this sense, scientists and engineers may both be considered technologists; the three fields are often considered as one for the purposes of research and reference.

The exact relations between science and technology in particular have been debated by scientists, historians, and policymakers in the late 20th century, in part because the debate can inform the funding of basic and applied science. In the immediate wake of World War II, for example, in the United States it was widely considered that technology was simply "applied science" and that to fund basic science was to reap technological results in due time. An articulation of this philosophy could be found explicitly in Vannevar Bush's treatise on postwar science policy, *Science--The Endless Frontier*: "New products, new industries, and more jobs require continuous additions to knowledge of the laws of nature ... This essential new knowledge can be obtained only through basic scientific research." In the late-1960s, however, this view came under direct

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attack, leading towards initiatives to fund science for specific tasks (initiatives resisted by the scientific community). The issue remains contentious—though most analysts resist the model that technology simply is a result of scientific research.

General understanding:

Explain the distinction between science, engineering and technology.

What kind of process is engineering?

Why should we study technology?

What had happened to technological sphere in 1960s?

Task 1. Listen and repeat.

Loosen.....pull.....push.....put.....take.....tighten



Task 2. Complete the instructions. Use the words from exercise 1.

1.	the hammer on the table.	4.	the lever
2.	the hammer off the table.	5	the nut.
3.	the lever.	6.	the nut.

Task 3. Match the parts with their functions.

Part

Function

 1. Thermometer______a) shine a light

 2. Compass

 3. Torch

 4. Clock

 5. Alarm

- 6. Solar panel
- 7. Handle
- 8. Antenna

- f) receive radio signals
- g) measure temperature
- h) make a loud noise

Task 4. Make a list of job titles useful for you. Use a dictionary.

Examples: marine technologist, computer operator, automotive engineer, architectural technician

Task 5. Match the pictures with the verbs in the box.

cut drive in grip loosen tighten

INVENTIONS

Which of these inventions do you think the most important? Rank them from 1 (the most important to you) to 10. The whole class will decide later which ones you will be able to survive without,

Television	Internet	Car	Clock	Computer	Мар
Photography	Nuclear energy	Solar energy	Electricity	Washing machine	Microwave
Printing Paper		Videogames Cinema		Airplane	Space shuttle
Mirror	Fuel	Sewing machine	Telephone	WC	Twitter
Penicillin	Whats/App	Google	Remote control	Credit card	Barcode
Radio	Wheel	Hairdryer	Х-гау	MP3 player	Light bulb
Scissors	Batteries	Glasses	Diaper	Post mail	Post-it

					notes
Magnifying glass	Tablet	Mobile phone	Calculator	Ink	Wikipedia

i + 1	1	2	3	4	15	6	17	8	9	10-
_						and the second s				

Speaking task:

Now imagine you are an inventor. Try to describe your new fabulous extraordinary gadget. Include the function, colours, size and price. You can draw a picture of it.

TASKS ON SCIENCE AND TECHNOLOGY

Task 1. Computing is just one of several new sciences and technologies. Match the name of these scientists and technological fields with their defiltions.

A

B

1. CYBERNETICS	a. The study of the behavior of bodies below-183
2. CRYOGENICS	b. The application of physics to stars and galaxies.
3. ASTROPHYSICS	c. The study of the way of information is processed
4. GEOPOLITICS	by the brain or by machines
5.GENETIC	d. The artificial reproduction of genetically
ENGINEERING	identical descendents of a simple plant or animal.
6. CLIONING	e. The study of the peaceful applications of nuclear
7.NUCLEAR	power
ENGINEERING	f. The study of effect on a country's politics and
	population

Task 2. THESE VERBS AND NOUNS ARE ALL ASSOCIATED WITH PARTICULAR BRANCHES OF SCIENCE, WHICH?

Α	В
I. DNA	a. Observatory
2. Alkalization	b. Bunsen bumper
3. Trigonometry	c. Equation
4. Meteorite	d. Microscope
5. Dissect	e. Gene
6. Pipette	f. Abacus
7. Integral calculus	g. Condense
8. Big bang	h. Telescope

Listening comprehension: Digital cameras

Digital cameras		l love my di	gital carr	era. I take it
everywhere with me. My	friends		, [out I've got
	really good p	hotos. Digital o	ameras a	are so much
better	cameras	with film. The	y're also	much better
than mobile phone camera	ts. My digita	camera		
pocket and takes great pho	otos. I usually	take a few p	hotos eve	ery day and
	online for my	friends to see.	The best	thing about
digital cameras is that they		to	use. It's	child's play.
The good thing is that digita	il cameras toda	ау		quality
photos	only g	get on really ex	pensive of	ameras. All
you need is 10 to 12 megapi	xels. That's			

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Technology



Across

3. I don't want my mobile phone to ring while I'm in the theatre. I think it is the best to it .

5. I want to listen to the news, but the radio's too quiet. Can you ______ it please?

6. When you have done that, you can it and atch the show.

7. Of course the TV isn't working. You forgot to connect it to the power supply. You have to it .

Down

1. When I got my new PC, out of its box, it wasn't ready to use. I had to _____ it

2. If you want to know the price of the ticket for the concert, you can ______ it _____ on the internet.

3. This computer game has stopped working. I'm going to _____ it ____ and start it again to see if it works.

4. Mum thinks your DVD player is too loud. She wants you to ______ it _____.



Switch on/off shut down Turn up/down set up plug in look up



Answer the questions.

22

1. What can you say about the distinction between science, engineering and technology?

2. Technology is often a consequence of science and engineering do you agree? TECHNOLOGIES

Task. Name the following devices by putting in the missing letters



Task. Match the expressions with their definition. Follow the example.

1. browse	a) transfer data from another computer to the computer
2. be logged-in	you are using
3. block someone	b) surf internet resources.
4. chat room	c) end an authenticated session.
5. download	d) remote accessi b le programme that lets you do online
6. logout	keyword searches.
7. search engine	e) deny someone's access to your personal account.
8. upload	f) transfer data from the computer you are using to
	another computer.
	g) be connected to a computer system by given your ID
	(username and passord)
	h) a virtual room where you can communicate with other
	members.

Task. Complete the sentences. Follow the example.

e.g. Most teenagers have a mobile phone so they can communicate with their parents at any time.



Pre-reading comprehension:



Active vocabulary

- encompass maintain electronics specialized specific applied science
- vacuum tube transistor rapid outnumber capable mechanical engineer

lighthouse an eminent physicist compositional requirements lime ultimately

Text: Engineering



Engineering (from Latin *ingenium*, meaning "cleverness" and *ingeniare*, meaning "to contrive, devise") is the application of scientific, economic, social, and practical knowledge in order to invent, design, build, maintain, and improve structures, machines.

devices, systems, materials and processes. The engineering is discipline extremely broad, and encompasses a range of more specialized fields of engineering, each with a more specific emphasis on particular areas of applied science, technology and types of application. The early stages of electrical engineering included the experiments of Alessandro Volta in the 1800s, the experiments of Michael Faraday and others and the invention of the electric motor in 1872. The work of James Maxwell and Heinrich Hertz in the late 19th century gave rise to the field of electronics. The later inventions of the vacuum tube and the transistor further accelerated the development of electronics to such an extent that electrical and electronics engineers currently outnumber their colleagues of any other engineering specialty. The inventions of Thomas Savery and the Scottish engineer James Watt gave rise to modern mechanical engineering. The development of specialized machines and their maintenance tools during the industrial revolution led to the rapid growth of mechanical engineering both in its birthplace Britain and abroad. John Smeaton was the first self-proclaimed civil engineer, and is often regarded as the "father" of civil engineering. He was an English civil engineer responsible for the design of bridges, canals, harbours and lighthouses. He was also a capable mechanical engineer and an eminent physicist. Smeaton designed the third Eddystone Lighthouse (1755-59) where he pioneered the use of 'hydraulic lime' (a form of mortar which will set under water) and developed a technique involving dovetailed blocks of granite in the building of the lighthouse. His lighthouse remained in use until 1877 and was dismantled and partially rebuilt at Plymouth Hoe where it is known as Smeaton's Tower. He is important in the history, rediscovery of, and development of modern cement, because he identified the compositional requirements needed to obtain "hydraulicity" in lime; work which led ultimately to the invention of Portland cement.

General understanding:

1. What is engineering?

2. What can you say about the early stages of engineering?

Task No1 Make sentences with the following words.

A spanner		nails
Pliers	cut (s)	bolts and wire
A screwdriver	grip (s)	nuts and bolts
A chisel	drive (s) in	paper and string
Scissors	tighten (s) and loosen (s)	screws
A saw		wood
Hammers		wood and metal

Task M2 Correct this description. There are six mistakes in location. Here is one way to set up your computer station. Put your screen in the centre of the system. Then put one speaker in the centre of the left, and put the other speaker in the centre on the right. Put the scanner at the top on the left, and put the computer at the top on the right. Then put the DVD drive at the top in the middle and put the printer at the bottom on the left. Finally, put the keyboard at the bottom on the right, and put the mouse at the bottom in the center.



Listening comprehension: Genetic engineering --

Task. UNJUMBLE THE WORDS

I think the <u>engineering genetic of idea fascinating is</u>. It's also quite dangerous. Fiddling around with what makes <u>less us might us human human make</u>. We could end up creating a Frankenstein's monster. The idea of genetic engineering for been centuries around has. Scientists change to wanted always have us. The real breakthrough came <u>last in latter of century the half</u>. Geneticists cracked the genetic code and found ways of altering our genes. Now <u>and animals clone can they reproduce</u> human tissue and organs. I don't think it'll be too long before scientists clone a person. <u>has down all fuss died Once the</u>, younger generations will be more accepting of genetic engineering. <u>live even might We hundred two be to</u> years old.



Task: A) Insert the words from above into the most appropriate sentences below.

1) The project needs to be finished by the end of the month. Some of us are may have to burn the midnight . (Work very long hours)

2) This is going to cost a lot of money and time. We need to _____ the numbers before we start drawing up a workplan. (Do calculations)

We all need to think outside the ______ if we want to find a solution to this problem.
 A project of this size not been attempted before in this company. (Use unconventional thinking)

4) We need an instrument devised to guarantee uniformity regarding the horizontal evenness of stuctures or erections for the personnel engaged in their assembly or fabrication. In _____''s terms, a spirit level. (Non -technical language)

5) We are still in the planning stage of the project but we can't blame all the mistakes that are made on ______''s Law. (The inevitability of human error)

6) He inherited the family business but managed to ______ it completely into the ground by his lack of expertise and awful business decisions. (Ruined)

7) We don't know how long it would take to build this complex but, off the top of my perhaps it would take one year at least. (A rough guess) Our client's specifications are not all that clear. I can't make head nor ______ of them. (not able to understand clearly)

9) This is a very new technology but the learning ______ for this field is pretty slow. By the time we train people for it, the technology could change significantly. (Rate of progress, ability, and experience in the acquisition of knowledge)

10) They have already started laying the foundations for the new factory. Most of the structure is prefabricated and the facility is expected to be up and ______ before the end of the year. (Fully functional and ready for use)

In the field of architecture, the Japanese are _____ years ahead in many ways. (Have a technological advantage)

12) The Empire State building was built using the _____ method. The designs weren't even finished before construction started. (Quick and effective building method)

13) Now that the planning has been done and the contracts have been signed we can set the ______ in the motion. (Initiate an event or project)

14) There are strict regulations in the construction industry so that nobody cuts ______, particularly in health and safety matters. (Doing things cheaply to save money or time)

15) The legal department has to deal with all the red _____ when we start a large construction project. (Bureaucracy)

Building material costs have gone through the _____ just lately. (Become excessively expensive)

17) The local authority keeps ______ us about the permissions and licenses to begin construction. Until the local elections have taken place, I doubt they will be very cooperative. (Using delaying tactics)

18) Local bylaws mean that all work stops at 6 pm due to noise pollution rules and regulations in (Urban or residential areas)

19) She is one of our best architects and knows all the tricks of the _____. (A very experienced expert in the field)

Task: B) Follow up! Now write five sentences using the expressions from above: e.g. The whole project is going like clockwork etc.



ENGINEER CROSSWORD PUZZLE



Across

- 2. Deals with movements humans make
- 4. Insulate houses and buildings
- 7. Desing components of railroads
- 11. Manipulates and studies DNA
- 12. Work on exploration
- 13. Make food processing machines
- 14. Design X-Ray macines
- 15. Make Jet engines
- 16. Design highways and flow of traffic
- 17. Design Nuclear power and plants,
- 18. Process oil reserves
- 20. Make sure an item is of good quality
- 22. Test the stress point of materials
- 23. Make advances in technology for health
- 24. Design animals' habitats
- 25. Makes medicine suitable for animals
- 26. Oversees water quality and sewage treatment

Down

- I. Makes planes and space crafts
- 3. Design and build tunnels and bridges
- 5. Make anti-lock brakes for cars
- 6. Design electrical wires and electrical poles
- 8. Use principles of math and science to design mechanical products
- 9. Maintain design of software systems
- 10. Design phones and how they transmit data to one another
- 19. Supervise lightning manufacturing
- 21. Responsible for making sure your utilities are available



Answer the questions:

1. What is engineering?

2. What can you say about the early stages of engineering?

3. What kind of the work of James Maxwell and Heinrich Hertz in the late 19th century gave rise to the field of electronics?

4. What kind of inventions of Thomas Savery and the Scottish engineer James Watt gave rise to modern mechanical engineering?

5. What kind of engineer was John Smeaton?

6. For what John Smeaton was as an English civil engineer?

- 7. What and when did Smeaton design?
- 8. Why is he important as an English civil engineer?



Unit 2. Lesson 2. Text: Metal working processes. Pre-reading comprehension: Active Vocabulary

useful shapes- foydali	
shakllar	
subjected-	
amounts-	
performed-	
hardens-	

at leastcommonsheetbilletorificedie-

window framestubeshollowinitialthick-walled -

Text: Metal working processes

Metals are important in industry because they can be easily deformed into useful shapes. A lot of metal working processes have been developed for certain applications. They can be divided into five broad groups:

- 1. Rolling
- 2. Extrusion
- 3. Drawing
- 4. Forging
- 5. Sheet-metal forming

During the first four processes metal is subjected to large amounts of strain (deformation). But if deformation goes at a high temperature, the metal will recrystallize- that is, new strain- free grains will grow instead of deformed grains. For these reason metals are usually rolled, extruded, drawn, or forged above their recrystallization temperature. This is called hot working. Under these conditions there is no limit to the compressive plastic strain to which the metal can be subjected. Other processes are performed below the recrystallization temperature. These are called cold working. Cold working hardens metal and makes the part stronger. however, there is a limit to the strain before a cold part cracks.

Rolling

Rolling is the most common metalworking process. More than 90 percent of the aluminum, steel and copper produced is rolled at least once in the course of production. The most common rolled product is sheet. Rolling can be done either hot or cold. If the rolling is finished cold, the surface will be smoother and the product stronger.

Extrusion

Extrusion is pushing the billet to flow through the orifice of a die. Products may have either a simple or a complex cross section. Aluminum window frames are the examples of complex extrusion. Tubes or other hollow parts can also be extruded. The initial piece is a thick-walled tube, and the extruded part is shaped between a die on the outside of the tube and a mandrel held on the inside. In impact extrusion (also called back extrusion) (босимбиланштамповкалаш), the work piece is placed in the bottom of a hole and loosely fitting ram is pushed against it. The ram forces the metal to flow back around it, with the gap between the ram and the die determining the wall thickness. The example of this process is the manufacturing of aluminum beer cans.

General understanding

1. Why are metals worked mostly hot? 2. What properties does cold working give to metals? 3. What is rolling? Where is it used? 4. What is extrusion? What shapes can be obtained after extrusion? 5. What are the types of extrusion?

Task 1. Find the following in the text:

- 1. могут легко деформироваться; osonlik bilan deformatsiyalanishi mumkin
- 2. нужные формы; kerakli shakllar
- 3. подвергать большим деформациям; katta deformatsiyalarga ta'sir qilish
- 4. зерна свободные от деформации; deformatsiyasiz don
5. температура перекристаллизации; gayta kristallanish harorati

6. пластическая деформация сжатия; sigishni plastik deformatsiyasi

7. самый обычный процесс обработки металла; eng keng tarqalgan metallni qayta ishlash

8. самое обычное изделие проката; eng keng targalgan mahsulot o'rami

9. отверстие фильеры; teshik golib, o'lik tuynuk

10. первоначальный: boshlang'ich, ilk

11. сложное сечение; murakkab bo'lim, kesishma

12. пустотелые детали; ichi bo'sh qismlar

13. свободно входящий плунжер; erkin kirish ramkasi

14. зазор между плунжером (пуансоном) и штампом; punson (musht) va shtamplar orasidagi bo'shliq

15. толщина стенки; devor galinligi

Task 2. Give English equivalents of following sentences.

 Способность металла перекристаллизовываться при высокой температуре используется при горячей обработке. Metallning yuqori haroratda qayta kristallanish qobiliyati issiq ishlov berish uchun ishlatiladi
 Перекристаллизация — это рост новых, свободных от деформации зерен. Qayta kristallanish-bu yangi, deformatsiyalanmagan donlarning o'sishi.
 Во время горячей обработки металл может подвергаться очень большой пластической деформации сжатия. Issiq ishlov berish vaqtida metall juda katta plastik siqilish deformatsiyasiga duch kelishi mumkin.

4. Холодная обработка делает металл тверже и прочнее, но некоторые металлы имеют предел деформации. Sovuq ishlov berish metallni qattiqroq va kuchliroq qiladi, ammo ba'zi metallar deformatsiya chegarasiga ega.

5. Листовой прокат может производиться горячим или холодным. Plitalar issiq yoki sovuq bo'lishi mumkin.

 Поверхность холоднокатаного листа более гладкая и он прочнее. Sovuq oʻralgan varaqning yuzasi yanada silliq va bardoshli(kuchli)dir.

7. Поперечное сечение фильеры для экструзни может быть простым или сложным. Extrusiya uchun ko'ndalang kesimi kesish oddiy yoki murakkab bo'lishi mumkin.

 Алюминиевые и медные сплавы являются наилучшими для экструзии из-за их пластичности при деформации. Alyuminiy va mis qotishmalari deformatsiya paytida ularning egiluvchanligi tufayli ekstruziya uchun eng yaxshisidir.

9. Алюминиевые банки, тюбики для зубной пасты являются примерами использования штамповки выдавливанием. Alyuminiy qutilar, tish pastasi uchun naychalar ekstruziya uchun shtamplashni qoʻllashning namunasidir.

10. Толщина стенки алюминиевой банки определяется зазором между пунсоном и штампом. Alyuminiyning devor qalinligi zimba (punson) va shtamp orasidagi bo'shliq bilan aniqlanadi

It's	that	these ?- They're	this those
		What's	called in English?
	0		called a screw.
		What's	called?
	0		called a motorbike
		What are	called in English?
	0		called bolts.
		What are	called?
	0	**	called antennas

Task 3. Complete the dialogues with the words in the box.



Task 4. Repeat new words and match them with pictures.

nails.....bolts.....nuts.....spanner.....washers....staples.....screws.....

-



Task 5. Match the words with the pictures

Electrical power sources

-

- 1. Mains electricity * AC adapter
- 2. Solar power

3. Dynamo 4. Batteries

Listening comprehension:

Mobile phones

How important mobile phone?	Do you really need it? In
the 1980s there were no mobile phones. People	phone
their family and friends and do business. Of course,	, there were more public
telephones then. There was a telephone box	street corner.
wonder whether mobile phones	_ thing. For sure, they are
very convenient, but they can	. There's nothing worse
than talking to someone and then	ten minutes while they
answer their phone. I have even seen people	person chats

on the phone for 30 minutes. How would if you didn't have a mobile? Would you miss listening to other people's conversations on the train?

Answer the questions: 1. Why are metals so important in industry? What are the main metalworking processes?

Unit 2. Lesson 3. Drawing (Sheet metal forming, forging) Pre-reading comprehension: Active Vocabulary

To pull Reduction To achieve In series Beyond Yield point To retain Rod Bar Involved

100

To bend Shearing Edge To grip Lower die Upper die Forming operation Tolerance Upsetting

Blow

Dimension Required Increase **Open-die** forging Hammering Within To enclose Coining Imprint Clamp To hit

Text: Drawing

Drawing consists of pulling metal through a die. One type is wire drawing. The diameter reduction that can be achieved in one die is limited, but several die in series can be used to get the desired reduction. Drawing --- It's a process a crosssection of solid rod, wire or tubing is reduced or changed in shape by pulling it through a die.

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Deep Drawing

1. Deep drawing is a metal forming process in which sheet metal is stretched into the



desired shape. A tool pushes downward on the sheet metal, forcing it into a die cavity in the shape of the desired part.



Drawing

Wire drawing Starling rod or wire K drawn through several drawing dies to reduce diameter. Change in croossectional area

% cold work-

100

Original area

Deep drawing: - Used to shape cup like articles from flats and sheets of metals Drawing

- 2. Sheet metal forming to make cup-shaped, box-shaped, or other hollow-shaped parts
- 3. clearance c= 1.1 t
- 4. where $l = \text{stock}^5$ thickness
- 5. In other words, clearance is about 10% greater than stock thickness

Sheet metal forming

Sheet metal forming is widely used when parts of certain shape and size are needed. It includes forging, bending and shearing. One characteristic of sheet metal forming is that the thickness of the sheet changes little in processing. The metal is stretched just beyond its yield point (2 to 4 percent strain) in order to retain the new shape. Bending can be done by pressing between two dies. Shearing is cutting operation similar to that used for cloth.

Each of these processes may be used alone, but often all three are used on one part. For example, to make the roof of an automobile from a flat sheet, the edges are gripped and

the piece pulled in the tension over a lower Next an upper die is pressed over the top, finishing the forming operation (shtampovkalash), and finally the edges are sheared off to give the final dimensions.

Types of Sheet Metal Bending

 V-bending - performed with a Vshaped die

Performed on a

press brake

- V-dies are simple and inexpensive
- 7. Edge bending performed with a wiping die
- Pressure pad

required

Dies are more complicated and costly

Forging

Forging is the shaping of a piece of metal by pushing with open or closed dies. It is usually done hot in order to reduce the required force and increase the metal's plasticity.

Open-die forging is usually done by hammering a part between two flat faces. It is used to make parts that are too big to be formed in a closed die or in cases where only a few parts are to be made. The earliest forging machines lifted a large hammer that was then dropped on the work piece, but now air or steam hammers are used, since they allow greater control over the force and the rate of forming. The part is shaped by moving or turning it between blows.

Closed-die forging is the shaping of hot metal within the walls of two dies that come together to enclose the work piece on all sides. The process starts with a rod or bar cut to the length needed to fill the die. Since large, complex shapes and large strains are



die.

involved, several dies may be used to go from the initial bar to the final shape. With closed dies, parts can be made to close tolerances so that little finish machining is required.

Two closed-die forging operations are given special names. They are upsetting and coining. Coining takes its name from the final stage of forming metal coins, where the desired imprint is formed on a metal disk that is pressed in a closed die. Coining involves small strains and is done cold. Upsetting involves a flow of the metal back upon itself. An example of this process is the pushing of a short length of a rod through a hole, clamping the rod, and then hitting the exposed length with a die to form the head of a nail or bolt.

Types of Forging Operations (a) Open-dic forging



🗯 General understanding

- 1. How can the reduction of diameter in wire drawing be achieved?
- 2. What is sheet metal forming and where it can be used?
- 3. What is close-die forging?
- 4. What is forging?
- 5. What are the types of forging?
- 6. What types of hammers are used now?
- 7. Where are coining and upsetting used?
- 8. What process is used in wire production?
- 9. Describe the process of making the roof of a car.

Task 1. Find the following word combinations in the text:

- 1. протягивание металла через фильеру; metall yordamida metallni cho'zish
- 2. волочение проволоки; simni cho'zish

3. уменьшение диаметра; diametrini kamaytirish

4. толщина листа; varaqning qalinligi

5. растягивать выше точки текучести; oqim nuqtasidan yuqoriga cho'zish

6. сохранить новую форму; yangi shakini saqlash

7. края отрезаются; girralari kesiladi

8. конечные размеры; oxirgi (yakuniy)o'lchamlari

9. уменьшить необходимое усилие; kerakli harakatlarni kamaytirish

10. увеличить пластичность металла; metallning egiluvchanligini oshirish

11. воздушные или паровые молоты; havo yoki bug' bolg'alari

12. сила и скорость штампования; urish (shtampovkalash)kuchi va tezligi

13. внутри стенок двух штампов; shtampovkalash ikki devor ichida

14. отделочная обработка; tugatish jarayoni

15. малые допуски; kichik toleranslar, imkoniyatlar

Task 2. Translate into English:

1. При волочении проволоки диаметр отверстия волочильной доски каждый раз уменьшается. Simni cho'zishda chizilgan taxtaning teshik diametri har safar kamayadi

2. Штамповка листового металла включает в себя ковку, изгиб и обрезку. Metall listlarni shtamplash siqish, o'yish, bukish va qirqishni o'z ichiga oladi

 Небольшая деформация листа при растяжении помогает сохранить новую форму детали. Metall listning ozgina cho'zish deformatsiyasi qismning yangi shaklini saqlashga yordam beradi.

4. Изменение формы при штамповке производится путем сжатия между двумя штампами. Shtamplash paytida shakli o'zgarishi ikki shtamp orasidagi siqish yo'li orqali amalga oshiriladi.

Края листа при штамповке отрезаются для получения конечных размеров.
 Shtamplash paytida varaqning qirralari oxirgi o'lchamlarni olish uchun kesiladi.

6. При проковке деталь должна быть горячей для уменьшения необходимых усилий и увеличения пластичности металла. Tayyorlash jarayonida kerakli kuchlarni kamaytirish va metallning egiluvchanligini oshirish uchun gism issiq bo'lishi kerak. 7. После ковки в закрытых штампах детали не требуют большой механической обработки. Yopiq armaturalarni tayyorlashdan keyin qismlar katta ishlov berishni talab qilmaydi.

8. При чеканке деформация металла невелика и отпечаток формируется на поверхности металла. Zarb bilan metallning deformatsiyasi kichik va bosim metall yuzasida hosil bo'ladi.

9. Высадка используется для изготовления головок гвоздей и болтов. Ekish mixlar va murvatlar boshlarini tayyorlash uchun ishlatiladi

Task 3. Complete these sentences with can and can't, can can't has is isn't

- 1. A helicopter ______ fly sideways, but a plane _____.
- 2. A plane ______ fly sideways, but it ______ fly forwards.

3. A plane ______ fly straight up, but a helicopter _____.

4. A plane ______ fly straight up, but it ______ fly diagonally.



 Task 4. Complete the text about the robot armwith the words in the box.

 This robot arm (1)_____ like a human arm. It (2)_____ a "wrist", an "elbow" and a "shoulder"

The wrist (3) like the human

wrist. It (4)_____ three movements. It (5)_____ rotate it. It (6)_____ move from side to side. It (7)_____ move up and down.

The elbow (8)______ like the human elbow. It (9)_____ one movement. It (10)_____ move up and down.

 The shoulder (11)_______ like the human shoulder, because it only one

 (12) ______ two movements. It (13)_____ rotate, and it

 (14) _____ move up and down. But it (15) _____ move sideways.

Task 5. Put the verbs given in parentheses in the correct form:

1. The earliest forging machines lifted a large hammer that (to be then drop) on the work piece, but now air or steam hammers are used, since they allow greater control over the force and the rate of forming.

2. The part (to be shape) by moving or turning it between blows.

3. Closed-die forging (to be) the shaping of hot metal within the walls of two dies that come together to enclose the work piece on all sides.

4. The process (to start) with a rod or bar cut to the length needed to fill the die.

5. Since large, complex shapes and large strains (to be involve), several dies may be used to go from the initial bar to the final shape.

6. With closed dies, parts can be (make) to close tolerances so that little finish machining is required.

7. Two closed-die forging operations (to be give) special names.

Listening comprehension: Factories

I have a strange hobby. It's visiting factories. I'm really interested _______ things work and how they are made. I've learnt _______ on my factory visits. Factories are amazing. They are like mini cities. The thing that surprises _______ how everything works together. Everyone knows exactly what _______ to do it. Even the robots. Car factories are cool, but very noisy. A car assembly _______ a giant ballet dance with everything moving perfectly together. It's _______ visit factories. All you have _______ to their home page and see if they have visiting times, or write to them. The best factories ______ ones that produce food and drinks. You always ______. Unfortunately, you don't at car factories.

Answer the questions:

What is deep drawing? What is forging? What is die? Where is Sheet metal forming widely used?



Unit 3. Lesson 1. Metal working and metal properties

adles communication design descharter

ric-reading com	preneusion. Active vocabulary	
Feature	To weaken	To exhibit
To provide	Transverse	Inner
Improvement	Flow	Flaws
Property	Finished	Inclusion
Eliminate	Thinning	Trapped
Porosity	Fracture	Refining
Directional	Strain hardening	To avoid
To segregate	Brass	To undergo
Casting	Beverage	Tensile
Elongated	Can	1

Text: Metalworking and metal properties

An important feature of hot working is that it provides the improvement of mechanical properties of metals. Hot-working (hot-rolling or hot-forging) eliminates porosity, directionality, and segregation that are usually present in metals. Hot-worked products have better ductility and toughness than the unworked casting. During the forging of a bar, the grains of the metal become greatly elongated in the directionof flow. As a result, the toughness of the metal is greatly improved n this direction and weakened in direction transverse to the flow. Good forging makes the flow lines in the finished part oriented so as to lie in the direction of maximum stress when the part is placed in service. The ability of a metal to resist thinning and fracture during cold-working operations plays an important role in alloy selection. In operations that involve stretching the best alloys are those which grow stronger with strain (are strain hardening)- for example, the copper-zinc alloy, brass, used for cartridges and the aluminum-magnesium alloys in beverage cans, which exhibit greater strain hardening. Fracture of the workpiece during forming can result from inner flaws in the metal. These flaws often consist of nonmetallic inclusions such as oxides or sulfides that are trapped in the metal during refining. Such inclusions can be avoided by proper manufacturing procedures. The ability of different metals to undergo strain varies. The change of the shape after one forming operation is often limited by the tensile ductility of the metal. Metals such as copper and aluminum are more ductile in such operations than metals.



General understanding

1. How are the flow lines in the forged metal oriented and how does it affect the strength of the forged part?

2. What are the best strain-hardening alloys? Where can we use them?

3. What are the inner flaws in the metal?

4. Can a metal fracture because of the inner flaw?

5. What limits the change of the shape during forming operations?

Task 1. Find the English equivalents of the following phrases in the text:

1. важная особенность горячей обработки; issiq ishlov berishning muhim xususiyati

2. улучшение механических свойств металла; metallning mexanik xususiyatlarini yaxshilash

3. необработанная отливка; хот (ishlov berilmagan) quyma

4. направление максимального напряжения; maksimal kuchlanish yo'nalishi

 способность сопротивляться утончению и разрушению; mayinlashtirish va sinish(parchalanish)ga qarshi turish qobiliyati

6. проявлять большее деформационное упрочнение; ko'proq deformatsiyani kuchaytirish

7. разрушение детали при штамповке: shtamplashda detalning yorilishi sinishi

8. внутренние дефекты в метадле; metallning ichki kamchiliklari

9. неметаллические включения; metall bo'lmagan qo'shimchalar

10. способность металлов подвергаться деформации; metallarning deformatsiyaga uchrashi qobiliyati

11. ограничивается пластичностью металла при растяжении; cho'zilishdagi metallning egiluvchanligi bilan cheklanganadi

Task 2. Translate into English:

 Горячая обработка металла улучшает его механические свойства и устраняет пористость и внутренние дефекты. Issiq metallni qayta ishlash uning mexanik xususiyatlarini yaxshilaydi va kovaklilik va ichki nuqsonlarni yoʻq qiladi.

2. Удлинение зерен в направлении текучести при ковке значительно улучшает прочность металла в этом направлении и уменьшает его прочность в поперечном. Cho'ziltirishda paytida don oqimining yo'nalishi bo'yicha cho'zilishi bu yo'nalishda metallning kuchini sezilarli darajada yaxshilaydi va uning ko'ndalang kuchini kamaytiradi 3. Хорошая проковка ориентирует линии текучести в направлении максимального напряжения. Yaxshi zarb maksimal kuchlanish yo'nalishi bo'yicha oqim chiziqlarini boshqaradi.

4. Деформационное упрочнение металла при холодной обработке очень важно для получения металлов с улучшенными свойствами. Sovuq ishlov berishda metallning deformatsiyalanishi yaxshilangan xususiyatlarga ega bo'lgan metallarni ishlab chiqarish uchun juda muhimdir

5. Внутренние дефекты металла — это неметаллические включения типа окислов или сульфидов. Metallning ichki nuqsonlari oksidlovchi yoki sulfid kabi metall bo'lmagan inkluzivlardir

6. Изменение формы при штамповании металлических деталей ограничивается пластичностью металла при растяжении. Metall qismlarni shtamplashda qolib o'zgarishi cho'ziluvchan metallning plastikligi bilan cheklanadi



Task No 3. Look at the pictures and answer the questions.



- 1. How many pedals does it have?
- 2. How many levers does it have?
- 3. Is the steering wheel on the left or on the right?

Task 4. Read the manual. Write the letters (A-G) from the pictures next to the controls.

In the pictures, you can see the controls of the forklift truck. On the left is a lever. This is the direction lever $(1_____)$. Push this lever forwards, and the truck moves forwards. Pull it backwards, and the truck reverses. Next, you can see steering wheel $(2____)$. This turns the truck to the left and right. At the top, on the right, you can see two levers. Push the left-hand lever $(3____)$ forwards and fork moves up. Pull it back, and the fork moves down. Push the right hand-lever $(4____)$ forward, and the fork tilts up. Pull it back, and the fork tilts down. At the bottom, on the right, you can see a lever. This is the parking brake

(5_____). At the bottom, you can see two pedals. The LH pedal is the brake (6_____). The RH pedal is the accelerator (7______).

Task 5. Describe these movements of the truck. Use words from the manual. Example: A. The fork tilts down



Task 6. Give the Properties of metals and non-metals

-

Characteristic	Definition	Metals	Non-metals
Appearance			
Density			187
Strength		3	
Malleable			
Brittle		- 65	
Conductor			
Sonorous		30	
Ductile	0		

Listening a	comprehens	ion: Robots				1000			
Α	long tim	e ago, ro	bots				fiction.	Childre	n loved
5	looking	at movi	es with	robot	s. Tod	lay,	robots a	are rea	al, and
		In the f	uture, we	will al	l have	robots	. They w	vill vacu	uum the
floor, wash the	e dishes,			ou	r cars. I	even	think one	day we	e'll have
robot friends.	In Japan	today,			ma	king r	obots to	help old	l people
and to		It	's still early	y days	. I'd say	/ we a	re anothe	r 20 to 3	30 years
away from rob	oots		ir	our i	ives. W	hat wi	ll happen	to us v	when the
world is full o	f robots?	There'll be	no jobs. P	A IcDo	nalds wi	ll be			
Maybe one	day we	won't be	able to	tell	robots	and	humans	apart.	Maybe
		world.							

Unit 3. Lesson 2. Light industry

Pre-reading comprehension: Active Vocabulary

capital intensive light industry facilities consumer goods economic definition processed materials include small amount number of products potentially harmful levels chemical wastes degreasing agents

Text: LIGHT INDUSTRY

A manufacturing device typical of light industry (a print machine). Light industry is usually less capital intensive than heavy industry, and is more consumeroriented than business-oriented (i.e., most light industry products are produced for end users rather than as intermediates for use by other industries). Light industry facilities typically have less environmental impact than those associated with heavy industry, and zoning laws are more likely to permit light industry near residential areas. It is the production of small consumer goods. One economic definition states that light industry is a "manufacturing activity that uses moderate amounts of partially processed materials to produce items of relatively high value per unit weight". Examples of light industries include the manufacturing of clothes, shoes, furniture, consumer electronics and home appliances. Conversely, ship building would fall under heavy industry. Light industries require only a small amount of raw materials, area and power. The value of the goods are low and they are easy to transport. The number of products is high. While light industry typically causes little pollution, particularly when compared to heavy industries, some light industry can cause significant pollution or risk of contamination. Electronics manufacturing, itself often a light industry, can create potentially harmful levels of lead or chemical wastes in soil due to improper handling of solder and waste products (such as cleaning and degreasing agents used in manufacture).

General understanding:

- 1. What kind of sphere is light industry?
- 2. What is the difference between light and heavy industry?
- 3. What requires light industry?
- 4. What is light industry? What is the difference between light and heavy industry? What requires light industry?

Task I. INDUSTRY

What does industry mean?

List some of the major industries in Uzbekistan.



Task 2. Select one of the major industries in Uzbekistan and tell why you think it is important, and does well in Uzbekistan.

Task 3. Read the text: DID YOU HEAR ABOUT INDUSTRY?

Small industries started in just this way – people selling goods and services to each other. For hundreds of years, cottage industries were the only industries around. In the late 1700s, though, people started factories where workers could produce goods more quickly and reliably because of machines, such as sewing machines. Today, there are many types of industries around the world. In the 1750s in England, garment factories used spinning machines and looms to make fabric. The factories employed many people who had worked on farms before. Life began to change. Other factories opened. Car manufacturers opened factories to make cars. Not only adults, but children went to work in the factories. They worked long hours and the conditions were often unsafe. In some countries today, children still work in factories. Robots often do the jobs people used to do in factories. Heavy industry is a type of industry that needs lots of machines, equipment and workers. Building railroads, ships or skyscrapers are all types of heavy industry. Light industry is any industry that builds small products, such as furniture, computers, clothing, medical

equipment or electronics. Many people today work in service industries. These industries don't produce products that you can touch, but services you need. The person who wrote this article is a writer – a service profession. Lawyers and bankers are in service industries. So are doctors and nurses.

Pre-Industrial Revolution

Domestic Small Towns Cottage Industry Hand crafted Learn through apprenticeship Self-employed Own personal machines Trade with locals Cooperation Flexibility Sense of Accomplishment

Industrial Revolution Factories Growth of Cities Mass Production Taught needed skills on the factors- floor Employed by business Technological innovations make machines expensive Monotonous work of a single aspect of the good Competition Isolation Bad work conditions Environmental pollution Dissatisfaction of working class with working condition

Task 4. Read the passage about Industrial Revolution

Steam engines began to appear in the 1700s. This important invention used wood or coal as fuel to heat water in a boiler.

Steam from the hot water powered the engine, which ran the machines.

Since a steam engine could be placed anywhere, factories no longer had to be built along rivers. They could be built near fuel, raw materials, or labor.

Task 5. Do the Crossword puzzle.

INDUSTRY CROSSWORD PUZZLE

1. In the 1750s in , factories used spinning machines and looms to

make fabric. The ______ employed many people who had worked on farms before.

- 2. manufacturers opened factories to make cars. In some countries today
- 3. often do the jobs people used to do in factories.

industry is a type of industry that needs lots of machines, equipment and workers.

5. industry is any industry that builds small products, such as furniture, computers, clothing, medical equipment or electronics.

6. industry is a small business owned by just a few people or one person.

7. industry don't produce products that you can touch, but services you need.

Contraction of the local division of the loc	F	A	B	R	E	С	A	E	N	S	D	٤	E	R	М	E	
	E	A	A	R	N	L	1	G	H	T	U	S	R	U	0	A	
A A A A A A A A A A A A A A A A A A A	N	G	Ċ	H	1	L	D	R	ε	N	5	K	1	C	0	S	
	G	1	C	T	S	C	A	T	A	A	T	l	۷	A	S	T	l
	L	S	N	0	0	S	E	R	۷	1	C	E	ε	R	N	0	
-	A	ρ	0	U	N	R	L	N	Y	1	L	L	R	N	0	B	I.
	N	1	G	S	0	N	Y	B	L	A	K	E	S	K	1	0	1
	D	S	T	N	C	0	T	T	A	G	E	1	F	A	L	R	
														A	A		

Television

What do you think? Is television good or bad? I loved it . My eyes were glued to the TV screen for hours and hours. I watched cartoons and other . It was good at the time, but maybe I outside playing or doing something more useful. There's TV. There are so many programmes that you watch just because you're too lazy . A lot of people turn on the TV and sit in front of it all day or all night. time! I think television programmes are getting worse. Reality TV and celebrity chat _____. The only good things on TV nowadays is the news, live sport and comedy shows. Plus, an interesting

Unit 3. Lesson 3. Materials Science and Technology. Text: A. Mechanical Properties of Materials

Pre-reading comprehension: Active Vocabulary

Bar
completely
cyclic stress
decrease
elastic deformation
elastic limit
exceed
external forces
to propagate
to bend
to extend
to meet the needs

compression creep fatigue fracture loosen remaining permanent deformation shear to occur to respond to suffer torsion

cross-sectional area rupture simultaneously to stretch technique tension

twisting volume

Text: A. Mechanical Properties of Materials

Materials science and technology is the study of materials and how they can be fabricated to meet the needs of modern technology. Using the laboratory techniques and knowledge of physics, chemistry, and metallurgy, scientists are finding new ways of using metals, plastics and other materials.

Engineers must know how materials respond to external forces, such as tension, compression, torsion, bending and shear. All materials respond to these forces by elastic deformation. That is, the materials return their original size and form when the external force disappears. The materials may also have permanent deformation or they may fracture. The results of external forces are creep and fatigue.

Compression is a pressure causing a decrease in volume. When a material is subjected to a bending, shearing, or torsion (twisting) force, both tensile and compressive forces are simultaneously at work. When a metal bar is bent, one side of it is stretched and subjected to a tensional force, and the other side is compressed.

Tension is a pulling force; for example, the force in a cable holding a weight. Under tension, a material usually stretches, returning to its original length if the force does not exceed the material's elastic limit. Under larger tensions, the material does not return completely to its original condition, and under greater forces the material ruptures. Fatigue is the growth of cracks under stress. It occurs when a mechanical part is subjected to a repeated or cyclic stress, such as vibration. Even when the maximum stress never exceeds the elastic limit, failure of the material can occur even after a short time. No deformation is seen during fatigue, but small localized cracks develop and propagate through the material until the remaining cross-sectional area cannot support the maximum stress of the cyclic force. Knowledge of the tensile stress, elastic limits, and the resistance of materials to creep and fatigue are of basic importance in engineering.

Creep is a slow, permanent deformation that results from steady force acting on a material. Materials at high temperatures usually suffer from this deformation. The gradual loosening of bolts and the deformation of components of machines and engines are all the examples of creep. In many cases the slow deformation stops because deformation eliminates the force causing the creep. Creep extended over a long time finally leads to the rupture of the material.

General understanding

- What are the external forces causing the elastic deformation of materials? Describe those forces that change the form and size of materials.
- 2. What are the results of external forces?
- 3. What kinds of deformation are the combinations of tensions and compression?
- 4. What is the result of tension? What happens if the elastic limit of material is exceeded under tension?
- 5. What do we call fatigue? When does it occur? What are the results of fatigue?

- 6. What do we call creep? When does this type of permanent deformation take place?
- 7. What are the results of creep?

Task 1. Find the following in the text:

1. отвечать гребованиям современной технологии; zamonaviy texnologiya talablariga javob berish

2. используя лабораторные методы; laboratoriya usullarini qo'llash holda

3. новые способы использования металлов, metallardan foydalanishning yangi usullari

4. сжатие, растяжение, изгиб, кручение, cpe3; siqish, cho'zish, bukish, burish, kesish

5. возвращать первоначальный размер и форму; asl o'lcham va shaklni qaytarish

6. внешняя сила; tashqi kuch

7. постоянная деформация; doimiy deformatsiya

8. уменьшение объема; hajmi kamayishi

9. растягивающие и сжимающие силы; cho'ziluvchi va siqish kuchlari

 превышать предел упругости материала; materialning elastikligi chegarasidan oshib ketishi

11. повторяющиеся циклические напряжения; takroriy davriy kuchlanish

12. разрушение материала; materialni buzilishi, yo'q qilinishi

13. развитие и распространение мелких трещин; kichik yoriqlar bo'lishi va tarqalishi

14. сопротивление материалов ползучести и усталости; materiallarning yemirilishi va charchashiga chidamliligi

Task 2. Translate into English the following sentences:

 Упругая деформация — это реакция всех материалов на внешние силы, такие, как растяжение, сжатие, скручивание, изгиб и срез. Elastik deformatsiya - bu barcha materiallarning kuchlanish, siqish, burish, bükme va qirqish kabi tashqi kuchlarga reaktsiyasi hisoblanadi. Усталость и ползучесть материалов являются результатом внешних сил. Materiallarning charchashi va parchalanishi tashqi kuchlarning natijasidir
 Внешние силы вызывают постоянную деформацию и разрушение материала. Tashqi kuchlar materialning doimiy deformatsiyasiga va yoʻq qilinishiga olib keladi

4. Растятивающие и сжимающие силы работают одновременно, когда мы изгибаем или скручиваем материал. Biz materialni bukganda yoki buralganda kuchlanish va siqish kuchlari bir vaqtning oʻzida ishlaydi.

5. Растяжение материала выше предела его упругости дает постоянную деформацию или разрушение. Materialni egiluvchan chegarasidan yuqoriga cho'zish doimiy deformatsiya yoki singanlikni beradi

6. Когда деталь работает долгое время под циклическими напряжениями, в ней появляются небольшие растущие трещины из-за усталости металла. Agar qism tsiklik stress ostida uzoq vaqt ishlasa, unda metall charchoq tufayli mayda o'sayotgan yoriqlar paydo bo'ladi

7. Ползучесть — это медленное изменение размера детали под напряжением. sirpanish-bu kuchlanish ostida qismning hajmini asta-sekin o'zgartirishdir.

supporting surface	значение	qiymati
resistance	сцепление	yopishqoqligi; ulashish
friction	опорная поверхность	qo'llab-quvvatlash yuzasi
adhesion	движение	harakat
motion	трение	ishqalanish
value	сопротивление	qarshilik
distributed forces	распределенные силы	tarqatilgan kuchlar

Task 3. Find the equivalents

Task 4. Look through these examples and translate

A man can easily lift a large roll of glass wool but not a concrete beam. Glass wool is light but concrete is heavy. A man can bend a rubber tile but not a concrete tile. Rubber is flexible but concrete is rigid. Wood can burn but concrete cannot burn. Wood is combustible but concrete is non-combustible. Water vapour can pass through stone but not through bitumen. Stone is permeable but bitumen is impermeable. You can see through glass but not through wood. Glass is transparent but wood is opaque. Stainless steel can resist corrosion but mild steel cannot. Stainless steel is corrosion resistant but mild steel is not corrosion resistant. Heat can be easily transferred through copper but not through wood. Copper is a good conductor of heat but wood is a poor conductor of heat. Rubber can be stretched or compressed and will then return to its original shape but clay cannot. Rubber is elastic but clay is plastic. Bitumen can be dented or scratched easily but glass cannot.

Bitumen is soft but glass is hard.

Task 5. Now complete these sentences with properties:

a) The polythene membrane can prevent moisture from rising into the concrete floor. This means that polythene is _____.

b) The T-shaped aluminium section can resist chemical action, i.e. aluminium is.....

c) The stone block cannot be lifted without using a crane. This means that stone is.

d) The corrugated iron roof cannot prevent the sun from heating up the house, i.e. iron is.....

e) Glass wool can help to keep a house warm in the winter and cool in the summer, i.e. glass wool is.....

f) The ceramic tiles on the floor cannot be scratched easily by people walking on them. This means that ceramic tiles are

g) Asbestos sheeting can be used to fireproof doors. In other words asbestos is

h) Black cloth blinds can be used to keep the light out of a room, i.e. cloth is .

Task 6. Label the parts with the words in the box, and describe the tools.

Blade/blades handle/handles head jaws shaft
Example: 1. A pair of pliers has two handles and jaws.

Task 7. Look at this toolboard for 15 seconds. Then close the book and list all the tools.

Begin: Five screwdrivers. They're at the top, on the left.

above below to the left of to the right of

Task 8. Look again at the toolboard on the next page and make sentences with the words in the box.



Task 9. How can you describe this picture? Write and speak about the future of technology.

Listening task. Unjumble the words.

Science <u>subjects one the important is of most</u> we study at school. I loved it. I thought it was so interesting. Time <u>science went quickly my lessons very</u> in because I was always <u>and things on working experiments doing</u>. I liked all of the sciences, physics, biology and chemistry. I <u>science continued wish studying</u> I. I would love to be a scientist now. <u>be would scientist computer a being think</u> I great. Science is so important for our life and our world. <u>solved be can problems world's the of All</u> with science. We <u>because planets different to go can science of</u>. I hope governments pump lots of money into science so we <u>future the in scientists better and more have</u>. It's interesting to think about what future science will be like.

Answer the questions:

What is mechanical properties? What are Materials science and technology?



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Unit 3. Lesson 4. Text: B. Mechanical Properties of Materials Pre-reading comprehension:

Active Vocabulary

Ability	Definition	Stiffness
Amount	Density	Strain
Absorb	Ductility	Strength
Application	Failure	Stress
Brittle	Gradual	tensile strength
Car body	Permanent	Toughness
Constituent	Rigid	Toughness
Crack	To sink	yield strength
Creep resistance	Square root	

Text: Mechanical Properties of Materials

Density (specific weight) is the amount of a mass in a unit volume. It is measured in kilograms per cubic metre. The density of water is 1000 kg/m3 but most materials have a higher density and sink in water. Aluminum alloys, with typical densities around 2800kg/m3 are considerably less dense than steels, which have typical densities around 7800 kg/m3. Density is important in any application where the material must not be heavy.

Stiffness (rigidity) is a measure of the resistance to deformation such as stretching or bending. The young Modulus is a measure of resistance to simple stretching or compression. It is the ratio of the applied force per unit area (stress) to the fractional elastic deformation (strain). Stiffness is important when rigid structure is to be made.

Strength is the force per unit area (stress) that a material can support without failing. The units are the same as those stiffness, MN/m2, but in this case the deformationis irreversible. The yield strength is the stress at which a material first deforms plastically. For a metal the yield strength may be less than the fracture strength, which is the stress at which it breaks. Many materials have a higher strength in comparison than in tension.

Ductility is the ability of a material to deform without breaking. One of the great advantages of metals is their ability to be formed into the shape that is needed, such as car body parts. Materials that are not ductile are brittle. Ductile materials can absorb energy by deformation but brittle materials cannot.

Toughness is the resistance of a material to breaking when there is a crack in it. For a material of given toughness, the stress at which it will fail is inversely proportional to the square root of the size if the largest defect present. Toughness different from strength: the toughest steels, for example, are different from the ones with highest tensile strength. Brittle materials have low toughness: glass can be broken along a chosen line by first scratching it with a diamond. Composites can be designed to have considerably greater toughness than their constituent materials. The example of a very tough composite is fiberglass that is very flexible and strong.

Creep resistance is the resistance to a gradual permanent change of shape, and it becomes especially important at higher temperatures. A successful research has been made in materials for machine parts that operate at high temperatures and under high tensile forces without gradually extending. for example the parts of plane engines.

General understanding

- 1. What are the densities of water, aluminum and steel?
- 2. A measure of what properties is stiffness? When stiffness is important?
- 3. What is strength?
- 4. What is yield strength? Why fracture strength is always greater than yield strength?
- 5. What is ductility? Give the examples of brittle materials?
- 6. What is toughness?
- 7. What properties of steel are necessary for the manufacturing of a) springs,b) car body parts, c) bolts and nuts, d) cutting tools?

Where is aluminum mostly used because of its light weight?

Classification of material property:



 The maximum stress that any material will withstand before destruction is called ultimate strength.

Task 1. Find the following words and word combinations in the text:

I. количество массы в единице объема; birlik hajmidagi massa miqdori

- 2. килограмм на кубический метр; kub metr uchun kilogramm
- 3. мера сопротивления деформации; deformatsiya qarshilik o'lchovi

 отношение приложенной силы на единицу площади к частичной упругой деформации; birlik maydoniga qo'llaniladigan kuchning qisman elastik deformatsiyaga nisbati

5. жесткая конструкция; gattig gurilish

6. прочность на сжатие; bosimga chidamlilik kuchi

7. способность материала деформироваться не разрушаясь; materiallar qobiliyatini buzmasdan deformatsiya qilish

8. поглощать энергию путем деформации; deformatsiya orqali energiyani yutishi

9. обратно пропорционально квадрату размера дефекта; nuqson o'lchamining kvadratiga teskari proporsional

10. постепенное изменение формы; shaklni bosqichma-bosqich o'zgartirish

11. повышенные температуры; harorat ko'tarilishi

12. высокие растягивающие усилия; yuqori kuchlanish kuchlari

Task 2. Translate into English the following:

 Плотность измеряется в килограммах на кубический метр. Zichlik kubometr uchun kilogramm bilan o'lchanadi.

 Большинство материалов имеют более высокую плотность, чем вода и тонут в воде. Ko'pgina materiallar suvga nisbatan zichlikka cga va suvga cho'kadi.

Плотность материала очень важна, особенно в авиации.
 Materialning zichligi, ayniqsa aviatsiyada juda muhimdir.

 Модуль Юнга — отношение приложенной силы к упругой деформации данного материала. Yunga moduli bu qo'llaniladigan kuchning ma'lum bir materialning elastik deformatsiyasiga nisbati.

 Чем более металл жесткий, тем менее он деформируется под нагрузкой. Metall qanchalik qattiq bo'lsa, u yuk ostida shuncha kamroq deformatsiyslanadi.

 Когда металл растягивают, он сначала течет, то есть пластически деформируется. Metall cho'zilganida, u avval oqadi, ya'ni plastik deformatsiyalanadi 7. Свинец, медь, алюминий и золото — самые ковкие металлы. Qo'rg'oshin, mis, alyuminiy va oltin eng (yumshoq) moyil metallardir.

8. Сопротивление ползучести является очень важным свойством материалов, которые используются в аниационных моторах. Sirpanish (Cho'kish)ga qarshilik samolyot dvigatellarida ishlatiladigan materiallarning juda muhim xususiyatidir.

Task 3. Look through and learn the Mechanical Properties of Materials Strength - greatest stress that it can withstand without failure

Stiffness - ability of material to resist deformation

Elasticity - property of material that enables it to regain its original unreformed length once the load is removed

Ductility - ability of material to undergo a lot of plastic deformation before rupture

Brittleness - undergoes very little plastic deformation before rupture is said to be brittle

Hardness - the resistance of a material to penetration

Machinability - the ease with which a material can be machined

Resilience - capacity of a material to absorb energy within the elastic range

Toughness - capacity of a material to absorb energy without fracture

Task 4. Match the words.

Long	wires
Wise	life
Management	systems
Plastic	inf. Technology
Information	people
Science and	productivity
Improving	technology

Task 5. Give the synonyms of the following words.

fast -	big -	to last -
enormous -	problem -	to make -

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Listening task. Unjumble the words.

Many scientists say nuclear energy ______. Many normal people aren't so sure. I think ______ worry about nuclear energy. We hear on the news about the dangers of nuclear power. Many years ago there was

______ in Chernobyl, Russia. A nuclear reactor caught fire and melted. Because of this, deadly radiation spread across ______ Europe. There were reports that sheep in England caught radiation sickness. I think things are safer now. Many countries trust nuclear energy. France and Japan

______ of nuclear power stations. I think it's probably a good idea. We really need to stop ______. Nuclear power is a ______ to the environment. Perhaps we need to spend more money ______ safer. Unit 4. Lesson 1. Text: A. What is machine?! Pre-reading comprehension: Active Vocabulary

important part moving parts elements separately several small pieces Lathe Turbines Compressors Engine Refrigerators and airconditioners internal combustion chemical energy electric generator mechanical energy friction speed of machines fluctuation suitable cutting speed

Text: A: What is Machine?!

Machine design is an **important part** of engineering applications, but what is a machine? Machine is the devise that comprises of the stationary parts and **moving parts** combined together to generate, transform or utilize the mechanical energy. All the machines are made up of elements or parts and units. Each element is a separate part of the machine and it may have to be designed **separately** and in assembly. Each element in turn can be a complete part or made up of **several small pieces** which are joined together by riveting, welding etc. Several machine parts are assembled together to form what we call as complete machine. Here are some examples of the machines: 1) Lathe: It utilizes mechanical energy to cut the metals. The other types of machine tools also perform the same task.

2) Turbines: They produce mechanical energy.

3) Compressors: They use mechanical energy to compress the air.

4) Engines: They consume the fuel and produce mechanical energy

5) **Refrigerators and air-conditioners**: They use mechanical engineering to produce cooling effect.

6) Washing machines: They use mechanical energy to wash the clothes. What are machines? A machine is the devise that comprises of the stationary parts and moving parts combined together to generate, transform or utilize the mechanical energy.



General understanding

- 1. What are the machine design?
- 2. What kind of devise is machine?
- 3. From what all machines are made up?

Simple machines

As well as work efficiency and mechanical advantage





Task 1. Find English equivalents in the text:

- 1. обрабатываемый материал; ishlov beriladigan material
- 2. электропривод; elektr uzatuv (haydov)chi
- 3. более точный; yanada aniqroq batafsil
- 4. отдельные детали; individual (alohida) qismlar
- 5. процесс массового производства; ommaviy ishlab chiqarish jarayoni
- 6. приспособления для держания резца и детали; kesuvchi va ehtiyot qismlarni ushlab turish uchun asboblar

7. операции по механической обработке детали; qismlarga ishlov berish operatsiyalari

- 8. высоковольтный разряд; yuqori kuchlanishli razryad
- 9. сверление ультразвуком; ultratovushli burg'ulash
- 10. резание с помощью лазерного луча; lazer nurlari bilan kesish
- 11. гибкие производственные системы; moslashuvchan ishlab chiqarish tizimlari
- 12. детали круглого сечения; dumaloq qism kesishmalari (tafsilotlari)
- 13. поворачивать деталь вокруг ее оси; qisinni o'z o'qi atrofida aylantirish
- 14. двигать в сторону, двигать по направлению к детали; yon tomonga harakatlanish, qismga qarab harakatlanish
- 15. глубина резания; kesish chuqurligi
- 16. непрерывное вращение детали; qismning doimiy aylanishi
- 17. движение резца вдоль станины; ramka bo'ylab kesar harakati

Task 2. Translate into English:

1. Токарный станок позволяет производить детали круглого сечения. Tokarlik dastgohi dumaloq qismlarni ishlab chiqarish imkonini beradi.

2. Деталь зажимается в патроне или на планшайбе токарного станка. Ushbu qism kattrijda yoki tokarlik dastgobida siqiladi

3. Резец может двигаться как вдоль станины, так и под прямым углом к ней. Kesar dastgoh bo'ylab ham, unga to'g'ri burchak ostida ham harakatlanishi mumkin.

4. Современные токарные станки часто имеют цифровое управление. Zamonaviy tokar dastgohlari ko'pincha raqamli boshqaruvga ega.

Task 3. True/False statements.

1. Machine design is an important part of engineering applications. T F

2. Machine is the devise that comprises of the stationary parts and moving parts combined together to generate, transform or utilize the mechanical energy. T

3. All the machines are made up of elements or parts and units. T F

4. Each element is a separate part of the machine and it may have to be designed separately and in assembly. T F

5. Each element in turn can be a complete part or made up of several small pieces which are joined together by riveting, welding etc. T _____F

6. Several machine parts are assembled together to form what we call as complete machine. T F

7. Here are some examples of the machines: 1) Lathe: It utilizes mechanical energy to cut the metals.

8. The other types of machine tools also perform the same task. T____F

Listening task. Unjumble the words.

Answer the questions
- 1. What is machine?
- 2. What kind of types are there of machine?
- 3. What is Lathe?
- 4. What is turbine?
- 5. What is compressor?



energy and motion

Across

- 1. the transfer of heat from electromagnetic waves
- 5 the rate at witch someone or something can move or operate

Is the process by which heat energy Is transmitted through collisions between neighboring molecules?

11 the action or process of moving or being moved

- 12. the rate at witch something or someone can move or operate
- 14. the over all average of the kinetic energy substance
- 16. energy that a body possesses by virtue of being In motion.
- 18 the degree or intensity of heat present in a substance or object, especially as expressed according to a comparative scale and shown by a thermometer or perceived by touch.
- 19 the movement caused within a fluid by the tendency of hotter and therefore less dense material to rise, and colder, denser material to sink under the Influence of gravity, which consequently results in transfer of heat.
- 20 a Increase in the rate of speed of an object or person

Down:

- 1. a material that transfers heat very well
- 3 the quality of being hot: high temperature:
- 4 energy that Is a result of a vibration of particles
- 6 a unit used to mesure energy of work that Is equal to one newton
- the energy possessed by a body by virtue of Its position relative to others, stresses within itself, electric charge, and other factors
 - 9. a temperature scale commonly used by physicist
 - 10. a poor conductor of heat
 - 13. the ratio of useful output energy to input energy
 - 15. the speed that something go's In a given direction
 - 17. one unit of Joule Is equal to one ...

Unit 4. Lesson 2. Text: B. What is machine?! Pre-reading comprehension: Active Vocabulary

various applicationsinternal combustiongenerating mechanical energyutilizing mechanical energyconverting machinesvarious applicationselectric generatorlathe machinerotation of the shaftto cut metals

hydraulic pump

Classification of Machines. Considering the various applications of the machines, they are classified into three main types, these are:

1) Machines generating mechanical energy: The machines generating mechanical energy are also called as prime movers. These machines convert some form of energy like heat, hydraulic, electrical, etc into mechanical energy or work. The most popular example of these machines is the internal combustion engine in which the chemical energy of the fuel is converted into heat energy which in turn is converted into mechanical work in the form of the rotation of the wheels of the vehicle. Some other examples of this group of machines are gas turbines, water turbines, steam engine etc.

2) Machines transforming mechanical energy: These machines are called converting machines because they convert mechanical energy into other form of energy like electricity, hydraulic energy etc. Some examples of these machines are electric generator in which the rotation of the shaft is converted into electrical energy, and hydraulic pump in which the rotation energy of the rotors is converted into the hydraulic energy of the fluid.

3) Machines utilizing mechanical energy: These machines receive mechanical energy and utilize it for various applications. Some examples of these machines are lathe machine that utilizes the mechanical energy to cut metals and washing machine that utilizes the rotation of the rotor for washing the clothes. Machines may be divided into the two classes: (1) rotating machines, such as lathes,

boring mills, drills, presses, milling and grinding machines; and (2) reciprocating machines, such as slotters, planers, and shapers. The speed of machines of the first class is constant throughout each operation, and most of their energy is used to overcome the friction of boring, grinding, or cutting metal, the amount of power consumed by the friction of the machine itself being comparatively small. In machines of the second class, the power is subject to great fluctuations because, in addition to the friction of the work, friction and loss of energy are caused by the retardation, return, and acceleration of the machine. The work of shapers, slotters, and other machines, is done by the stroke of a reciprocating tool in one direction during the working stroke the tool must move at a suitable cutting speed, while on the return stroke, when no work is performed, it is desirable that it should travel as rapidly as possible.

General understanding

1. How many types of machines are classified?

2. What are the rotating machines?

3. What can you say about reciprocating machines?

Task 1. Read the new words and find the definition for them.

receive

mechanical energy

utilize

shapers

various applications

lathe machine

slotterscut the metals mechanical energy

Task 2. True/False statements.

 Lathe: It utilizes mechanical energy to cut the metals. The other types of machine tools also perform the same task. T____F___

2) Turbines: They produce mechanical energy. T _____ F____

Compressors: They use mechanical energy to compress the air.
 F

4) Engines: They consume the fuel and produce mechanical energy
 T F

5) Refrigerators and air-conditioners: They use mechanical engineering to produce cooling effect. T____F___

6) Washing machines: They use mechanical energy to wash the clothes.T F



Task 3. Put the verbs given in parentheses in the correct form: 1. The machines generating mechanical energy are also (to call) as prime movers.

2. These machines (to convert) some form of energy like heat, hydraulic, electrical, etc into mechanical energy or work.

3. The most popular example of these machines (to be) the internal combustion engine in which the chemical energy of the fuel is converted into heat energy which in turn is converted into mechanical work in the form of the rotation of the wheels of the vehicle.

3. Some other examples of this group of machines (to be) gas turbines, water turbines, steam engine etc.

4. These machines (to receive) mechanical energy and (to utilize) it for various applications.

5. Some examples of these machines (to be) lathe machine that utilizes the mechanical energy to cut metals and washing machine that utilizes the rotation of the rotor for washing the clothes.

Task 4. Fill in the gaps in the sentences according to the content of the text: 1. Machines may be divided into the two classes: (1) rotating machines, such as lathes, boring mills, drills, presses, milling and grinding machines; and.....

2. The speed of machines of the first class is constant throughout each operation, and most of their energy is used to overcome the friction of boring,

Listening task.

My energy levels	down. S	Sometimes I'm full of
energy, and sometimes I'm		energy. Mornings are
when my energy levels are high	n. I wake up	. I don't
need 30 minutes to wake up, lib	e some people l know	. For
foo	d I eat doesn't affect h	ow energetic I am. Some
people	lunch, while other	s complain they need to
eat something for an	I se	eem to have the same level
of energy	nothing all day.	The one thing that does
affect my energy is the weather	A bright, sunny day	gives me lots of energy. A
dull,	me feel	. I also
have a lot of energy if I'm doin	g something exciting -	
study or work.		

Answer the questions

- 1. What is machine?
- 2. What kind of types are there of machine?
- 3. What is Lathe?
- 4. What is turbine?
- 5. What is compressor?

Unit 4. Lesson 3. Machine -tools Pre-reading comprehension: Active Vocabulary

Machine tools	Interchangeable	Discharge
Electrically driven	Facility	By means of
Shape	Relative	Beam
Workpiece	Amount	Drilling
Accurate	Fluid	Flexible
Development	To lubricate	Range
To allow	Spark erosion	
	Text: Machine -tools	

Machine- tools are used to shape metals and other materials. The material to be shaped is called workpiece. Most machine-tools are now electrically driven. Machine-tools with electrical drive are faster and more accurate than hand tools: they were an important element in the development of mass-production processes, as they allowed individual parts to be made in large numbers so as to be interchangeable.

All machine tools have facilities for holding both the workpiece and the tool, and for accurately controlling the movement of the cutting tool relative to the workpiece. Most machining operation generate large amounts of heat and use cooling fluids (usually the mixture of water and oil) for cooling lubrication.

Machine-tools usually work materials mechanically but other machining methods have been developed lately. They include chemical machining, spark erosion to machine very hard materials to any shape by means of a continuous high-voltage spark (discharge) between an electrode and workpiece. Other machining methods include drilling using ultrasound, and cutting by means of a laser beam. Numerical control of machine-tools and flexible manufacturing systems have made it possible for complete systems of machine-tools to be used flexibly for the manufacture of a range of products.



PC-based Control for Machine Tools



General understanding

1. How are the cutting tool and the workpiece cooled during machining?

2. What other machining methods have been developed lately?

3. What is numerical control of machine tools used for?

Task 1. Read the new words and find the definition for them.

Machine- toolsto shape metalselectrical drivefaster and more accuratean important elementmass-productioncutting tooloperationgenerate

Task 2. True/False statements.

1. Machine-tools usually work materials mechanically but other machining methods have been developed lately. T _____F

2. They include chemical machining, spark erosion to machine very hard materials to any shape by means of a continuous high-voltage spark (discharge) between an electrode and workpiece. T____F___

3. Other machining methods include drilling using ultrasound, and cutting by means of a laser beam. T F

4. Numerical control of machine-tools and flexible manufacturing systems have made it possible for complete systems of machine-tools to be used flexibly for the manufacture of a range of products. $T _ F$

Task 3. Insert the proper word from the text.

1. Machine- tools are used to metals and other materials.

2. The material to be shaped is called

3. Most machine-tools are now

4. Machine-tools with electrical drive are faster and more accurate than hand tools: they were an important element in the processes, as they individual parts to be made in large numbers so as to be interchangeable.

6. Most machining large amounts of heat and use cooling fluids (usually the mixture of water and oil) for

POWER, BENCH AND MACHINE TOOLS

Task 4. Match the names of tools to the pictures.

sander, heat gun, angle, grinder, drill, screwdriver, drill press, lathe, bench grinder, table saw



lask 5. Match the names of tools	to the definitions
1. drill	a) a power tool that delivers hot air
2. drill bit	to something b) a tool with one or more abrasive
3. drill press	wheels' foe, sharpening tools
4. grinding machine	c) a machine for smoothing wood d) a machine with a flat surface to
5. heat gun	cut wood
6. sander	e) a heavy duty hole making machine
7. table saw	f) a power tool used to bore holes g) a cutting tool that rotates in a drill

Task 6. Fill in the table with the words given.

angle grinder, blade, button, chisel, cover, drill bit, drill press, hammer, handle, handsaw, head, heat gun, lathe, pliers, sander, scissors, talesaw, utility knife

Hand tools	Power tools	Parts of tools

Task 7. True or false?

1. A chisel is a tool for tightening and loosening screws.

2. A drill press is a hand tool.

3. A grinder is used for sharpening tools.

4. A lathe rotates your workpiece for expert carving, sanding and knurling.

5. A nail drawer can be used both for driving in and pulling out nails.

6. A table saw is a cutting tool.

7. Utility knives have retractable blades.

Task 8. Match.

1. angle	a) tools
2. drill	b) grinder
3. hand	c) saw
4. nail	d) bit
5. Phillips	e) knife
6. slip-joint	f) drawer
7. table	g) pliers
8. utility	h) screwdriver

Answer the questions

- 1. What are machine-tools used for?
- 2. How are most machine-tools driven nowadays?
- 3. What facilities have all machine-tools?

Unit 4 Lesson 4. Milling machines. (Drilling and boring machines) Pre-reading comprehension:

Active Vocabulary

milling machine versatile cutter cutting edges circumferences circular longitudinal to feed deep-hole-drilling

Milling Machines

In a milling machine the cutter is a circular device with a series of cutting edges on its circumferences. The work piece is held on a table that controls the feed against the cutter. The table has three possible movements: longitudinal, horizontal and vertical; in some cases, it can also rotate. Milling machines are the most versatile of all machine tools. Flat or contoured surfaces may be machined with excellent finish and accuracy. Angles, slots, gear, teeth and cuts can be made by using various shapes of cutters.

Drilling and Boring Machine

To drill a hole usually hole-making machine tools are used. They can drill a hole according to some specification, they can enlarge it, or they can cut threads for a screw or to create an accurate size or a smooth finish of a hole. Drilling machines are different in size and function, from portable drills to radial drilling machines, multispindle units, automatic production machines, and deep-hole-drilling machines. Boring is a process that enlarges holes previously drilled, usually with a rotating single-point cutter held on a boring bar and fed against a stationary workpiece. Task 1. Read the new words and find the definition for them.

milling machine	the cutter	a circular device
cutting edges	circumferences	controls the feed
Task 2. True/False	statements.	

 In a milling machine the cutter is a circular device with a series of cutting edges on its circumferences. T____F___

The work piece is held on a table that controls the feed against the cutter.
 T F

3. The table has three possible movements: longitudinal, horizontal and vertical; in some cases it can also rotate. T F

4. Milling machines are the most versatile of all machine tools. T F

5. Flat or contoured surfaces may be machined with excellent finish and accuracy. T F

6. Angles, slots, gear, teeth and cuts can be made by using various shapes of cutters.
T F

Task 3. Insert the proper word from the text.

1. To drill a hole usually tools are used.

2. They can, according to some specification, they can enlarge it, or they can for a screw or to create or a smooth finish of a hole.

4. Boring is a process that previously drilled, usually with single-point held on a boring bar and fed against a stationary workpiece.

Task 3. Put the verbs given in parentheses in the correct form:

1. In a milling machine the cutter (to be) a circular device with a series of cutting edges on its circumferences.

2. The work piece (to be to hold) on a table that controls the feed against the cutter.

3. The table (to have) three possible movements: longitudinal, horizontal and vertical; in some cases, it can also rotate.

4. Milling machines (to be) the most versatile of all machine tools.

5. Flat or contoured surfaces (may to be to machine) with excellent finish and accuracy.

6. Angles, slots, gear, teeth and cuts (can to be to make) by using various shapes of cutters.

Task 4. Match.

- 1. screwdriver
- 2. A saw
- 3. To dent
- 4. To mend
- 5. crank
- 6. steel

- a) tool used to tighten or make something looser
- b) To tool to cut
- c) To damage metal
- d) To repair

e) a hand tool consisting of a rotating shaft

with parallel handle

f) metal

Answer the questions. What is milling machine? What is drilling machine? What is boring machine?

5

Unit 4. Lesson 5. The Shaper and The Planer Pre-reading comprehension:

Active Vocabulary:

successive

stroke

reciprocating	ram
cuts	countershaft
curved	angular surface
surfaces	belt

A shaper is a machine that forms surface by successive reciprocating cuts of a tool over the work. The work is stationary with reference to the tool but moves laterally in small steps so that the successive cuts can be made. Although most of the work performed on shapers consists of plane horizontal surface, it is also possible to finish vertical and angular surface, and, with the proper tools and accessories, even curved surfaces may be machined.

distant survey

The size of a shaper is determined by the longest stroke of the ram. Shapers are driven by belt from a countershaft, by direct connected motor, or by hydraulic power.

Horizontal Shaping Machine

A shaper is type of



machine tool that uses linear relative motion between the workpiece and a single point cutting tool to machine a linear toolpath. The ram is moved back and forth typically by a crank inside the column. The horizontal arrangement is the most common.

Shaper:

IN JRYON

J ADCARD

COLUMN REAL OF

Uses of a horizontal shaping machine are:

Keyways in the boss of a pulley or gear can be machined without resorting to a dedicated broaching setup.

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Dovetail slides

Internal splines

Keywat cutting blind holes



Planer

Planer is a machine with a cutting tool that makes repeated horizontal strokes across the surface of a workpiece: used to cut flat surfaces into metal

Grinders

Grinders remove metal by a rotating abrasive wheel. The wheel is composed of many small grains of abrasive, honded together, with each grain acting as a miniature cutting tool. The process gives very smooth and accurate finishes. Only a small amount of material is removed at each pass of the wheel, so grinding machines require fine wheel regulation. The pressure of the wheel against the workpiece is usually very light, so that grinding can be carried out on fragile materials that cannot be machined by other conventional devices.

Task 3. Read the new words and find the definition for them.

shaper planer hand-operated high-speed spiral drivecross bar, Task 4. True/False statements.

1. Planers are essentially for machining plane surfaces which are larger than can be cut or reached on the shaper. T F The modern planer with modern electric controls has a high output.
 T F

3. The planer has a reciprocating table which travels beneath a cross bar on which the tool heads are mounted. T _____ F _____

4. Normally *one or two tool heads are mounted on the cross bar, but additional tools, generally for cutting vertical faces, may be mounted on the columns supporting the cross bar. $T_{\underline{F}}$

5. The usual design comprises two vertical columns between which the table reciprocates. T F

Task 5. What adjectives can the following words be associated with? surface, cut, tool, power, stroke, step

Task 6. Put the verbs given in parentheses in the correct form:

1. Planers (to be) essentially for machining plane surfaces which are larger than can be cut or reached on the shaper.

2. The modern planer with modern electric controls (to have) a high output.

3. The planer (have) a reciprocating table which travels beneath a cross bar on which the tool heads are mounted.

4. Normally one or two tool heads (to be mount) on the cross bar, but additional tools, generally for cutting vertical faces, may be mounted on the columns supporting the cross bar.

5. The usual design (to comprise) two vertical columns between which the table reciprocates.

6. The cross bar (to be so mount) that it can slide vertically on these columns.

7. All motions for feed or cut (to take) place either by dropping the cross bar, moving the tool head across the cross bar, or lowering the tool holder mounted on the tool head.

8. The first two of these motions (to be) generally power or hand-operated but the last is often hand-operated only.

9. The table (to be) normally operated by some form of rack-and-pinion or spiral drive.

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10. Modern high-speed planers (to be) now fully electrified.

Answer the questions

- 1. What is shaper?
- 2. What is planer?
- 3. How are Metal-cutting tools classified?

Unit 4 Lesson 6. Cutting tools Pre-reading comprehension:

Active Vocabulary: Cutting tools

multiple point boring mills classified as single point boring increasing the size of holes perform milling cutters cutting edges turning and boring on a shaper a straight path on lathes drills broaches the formation chips relief or clearance angles against the stationary workpiece the workpiece of a planer

Cutting tools

Metal-cutting tools are classified as single point or multiple point. A singlepoint cutting tool can be used for increasing the size of holes, or boring. Turning and boring are performed on lathes and boring mills. Multiple-point cutting tools have two or more cutting edges and include milling cutters, drills, and broaches. There are two types of operation; either the tool is moving on a straight path against the stationary workpiece, as on a shaper, or the workpiece is moving against the stationary tool, as on a planer. Relief or clearance angles must be provided to prevent the tool surface below the cutting edge from rubbing against the workpiece. Rake angles are often provided on cutting tools to cause a wedging action in the formation of chips and to reduce friction and heat.

Answer the questions

- 1. What is cutter tool?
- 2. What is boring?

3. How Relief or clearance angles must be provided to prevent the tool surface below the cutting edge from rubbing against the workpiece?

Clearance in Sheet Metal Cutting

Die size determines blenk size D_a

Punch size determines hole size D_n

c = clearance

Task 1. True/False statements.

1. Metal-cutting tools are classified as single point or multiple point.

T F

2. A single-point cutting tool can be used for increasing the size of holes, or boring. T F

3. Turning and boring are performed on lathes and boring mills. T

 Multiple-point cutting tools have two or more cutting edges and include milling cutters, drills, and broaches. T ____ F ____

5. Relief or clearance angles must be provided to prevent the tool surface below the cutting edge from rubbing against the workpiece. T F

6. Rake angles are often provided on cutting tools to cause a wedging action in the formation of chips and to reduce friction and heat. T F

Task 2. Read the new words and find the definition for them.

multiple point, increasing the size of holes, boring, boring mills, on lathes, cutting edges, milling cutters, drills, and broaches, a straight path, stationary

workpiece on a shaper, the workpiece of a planer, clearance angles, the

formation, chips

Task 3. Match.

Mechanical properties Strength

Plasticity

Elasticity

Ductility Tensile strength

Compression

a) It is the property of a material to come back to its original size and shape even after the load stops acting on it.

b) It is the capacity of the material to withstand the breaking, bowing, or deforming under the action of mechanical loads on it.

c) Fatigue the physical properties of the material which describes its behaviour under the action of loads on it.

d) It is the property of a material that makes it to be in the deformed size and shape even after the load stops acting on it.

e) It is the property of a material that allows it to deform or make into thin wires under the action of tensile loads plastically.

f) It is the property of a material that allows it to deform under tensile loading without breaking under the action of a load.

g) It is a pressure causing a decrease in volume.h) It is the growth of cracks under stress. It occurs when a mechanical part is subjected to a repeated or cyclic stress, such as vibration.

Task 4. Put the verbs given in parentheses in the correct form:

1. Metal-cutting tools (to be classify) as single point or multiple point.

2. A single-point cutting tool can be (to use) for increasing the size of holes, or boring.

3. Turning and boring (to be perform) on lathes and boring mills.

4. Multiple-point cutting tools (to have) two or more cutting edges and (to include) milling cutters, drills, and broaches.

5. There (to be) two types of operation; either the tool is moving on a straight path against the stationary workpiece, as on a shaper, or the workpiece is moving against the stationary tool, as on a planer.

6. Relief or clearance angles must be (to provide) to prevent the tool surface below the cutting edge from rubbing against the workpiece.

7. Rake angles (to be often provide) on cutting tools to cause a wedging action in the formation of chips and to reduce friction and heat.

Answer the questions

1. What is cutter tool?

2. What is the main function of cutting machine?

Unit 4. Lesson 7. Dies

Pre-reading comprehension: Active Vocabulary.

chip	tips	wire
friction	ceramic	to draw
content	truing	thread
range	die	hardene
inexpensive	matrix	to lubric
to permit	to employ	to screw
common	to pierce	nut
tungsten	to punch	outside
ingredient	matching	inside
diamond	coarse	

Dies

ate

Dies are tools used for the shaping solid materials, especially those employed in the pressworking of cold metals. In presswork, dies are used in pairs. The smaller die, or punch, fits inside the larger die, called the matrix or, simply, the die. The metal to be formed, usually a sheet, is placed over the matrix on the press. The punch is mounted on the press and moves down by hydraulic or mechanical force. A number of different forms of dies are employed for different operations. The simplest are piercing dies (пробивнойштамп), used for punching holes. Bending and folding dies are designed to make single or compound bends. A combination die is designed to perform more than one of the above operations in one stroke of the press. A progressive die permits successive forming operations with the same die.

In coining, metal is forced to flow into two matching dies, each of which bears a engraved design.

Wiredrawing Dies

In the manufacture of wire, a drawplate (волочильнаядоска) is usually employed. This tool is a metal plate containing a number of holes, successively less in diameter and known as wire dies. A piece of metal is pulled through the largest die to make a coarse wire. This wire is then drawn through the smaller hole, and then the next, until the wire is reduced to the desired measurement. Wiredrawing dies are made from extremely hard materials, such as tungsten carbide or diamonds.

Thread-Cutting Dies

For cutting threads on bolts or on the outside of pipes, a thread-cutting die (pe3b60Hape3HaMIJABUKA) is used. It is usually made of hardened steel in the form of a round plate with a hole in the centre. The hole has a thread. To cut an outside thread, the die is lubricated with oil and simply screwed onto an unthreaded bolt or piece of pipe, the same way a nut is screwed onto a bolt. The corresponding tool for cutting an inside thread, such as that inside a nut, is called a tap (METYHK).

Dies for Sheet Metal Processes

Most pressworking operations performed with conventional punch-and-die tooling

. The term stamping die sometimes used for high production dies



Open-Die Forging with Friction

Friction between work and die surfaces constrains lateral flow of work, resulting in barreling effect in hot open-die forging, effect is even more pronounced due to heat transfer at and near die surfaces, which cools the metal and increases its resistance to deformation



Open-Die Forging. Work is compressed between two flat dies, allowing metal to flow laterally with minimum constraint.

Common names include upsetting or upset forging



Deformation operation reduces height and increases diameter of work (similar to compression test)

(a) Figure 19.9 Three types of forging: (a) open-die forging

Closed-Die Forging Versus Flashless Forging



Comparison of closed-die forging with flash (left side of each illustration) and precision or flashless forging (right side) of a round billet. *Source* After H. Takemasu, V. Vazquez, B. Painter, and T. Altan.





Sequence in impression-die forging: (1) just prior to initial contact with raw workpiece, (2) partial compression, and (3) final die closure, causing flash to form in gap between die plates.

Task 1. Find English equivalents in the text:

1. удалять металлическую стружку; metall strujka(chip)larni olib

tashlash(yo'qotish)

- 2. острый режущий край; o'tkir kesish qirrasi
- 3. содержание углерода; tarkibida uglerod
- 4. режущая способность; kesish imkoniyati(qobiliyati)
- 5. сталь для скоростного резания: yuqori tezlikda kesish uchun po'lat
- 6. правка шлифовальных кругов; silliqlash g'ildiraklarini tartibga solish

7. гидравлическое или механическое давление; gidravlik yoki mexanik bosim

8. различные формы штампов; turli qolib (shtampovka)shakllari

Task 2. Translate the following sentences into English:

1. Все резцы и фрезы должны иметь острую режущую кромку. Barcha kesuvchilar va frezalashtirgichlar keskin qirralarga ega bo'lishi kerak.

2. Во время резания режуший инструмент и деталь имеют высокую температуру и должны охлаждаться. Kesish vaqtida kesish vositasi va qismi yuqori haroratga ega bo'ladi va ular sovutilishi kerak.

3. Углеродистые стали часто нспользуются для изготовления резцов потому, что они недорогие. Uglerod po'latlari ko'pincha arzon bo'lganligi sababli kesuvchilarni tayyorlash uchun ishlatiladi.

4. Быстрорежущие стали содержат вольфрам, хром и ванадий. Yuqori tezlikli kesuvchi po'latlarda volfram, xrom va vanadiy mavjud.

5. Алмазы используются для резания абразивных материалов и чистовой обработки поверхности твердых материалов. Olmoslar abraziv materiallarni kesish va qattiq materiallarning sirtini tugatish uchun ishlatiladi.

6. Для различных операций используют различные штампы. Turli xil operatsiyalar uchun turli xil markalardan foydalaniladi.

7. Волочильные доски для проволоки делаются из очень твердых материалов. Chizilgan taxtalar juda qattiq materiallardan tayyorlanadi.

8. Резьбонарезные плашки и метчики используются для нарезки резьбы снаружи и внутри. Rezba kesuvchi plitalar va musluklar tashqi va ichki rezbalarni kesish uchun ishlatiladi

Task 3. Put the verbs given in parentheses in the correct form:

1. Dies (to be tools use) for the shaping solid materials, especially those employed in the pressworking of cold metals.

2. In presswork, dies (to be use) in pairs.

3. The metal to be formed, usually a sheet, (to be place) over the matrix on the press.

4. The punch (to be mount) on the press and moves down by hydraulic or mechanical force.

5. A number of different forms of dies (to be employ) for different operations.

6. The simplest (to be pierce dies, used for punching holes.

7. Bending and folding dies (to be design) to make single or compound bends.

Task 4, Match.

1. Die	used to shape or put a pattern on metal or plastic
2 nunch	b) a piece of equipment that cuts holes in

- 2. punch
- 3. pierce

4. wiredrawing dies

5. drawplate

a) shaped piece or mo

- ld (= hollow container
- of metal or) made
- hard material, other

tungsten carbide or diamonds. e) is a metal plate containing a number of holes, successively less in diameter and known as wire dies.

d) made from extremely hard materials, such as

a material by pushing a piece of metal through it:

c) to go in or through something, esp. with

a pointed object, making a hole:

Answer the questions

- 1. What are dies?
- 2. Why are they utilized?

Unit 5. Lesson 1. Text: A Lathe.

Active Vocabulary:

lathe	depth	tolerance
circular cross-	headstock	machine tool
section	spindle	rotate
surface	chuck	workpiece
stationary	faceplate	axis
sideways	lathe bed	to perform
variety	to enable	various operations

Lathe is still the most important machine-tool. It produces parts of circular crosssection by turning the workpiece on its axis and cutting its surface with a sharp stationary tool. The tool may be moved sideways to produce a cylindrical part and moved towards the workpiece to control the depth of cut. Nowadays all lathes are power- driven by electric motors. That allows continuous rotation of the workpiece at a variety of speeds. The modern lathe is driven by means of a headstock supporting a hollow spindle on accurate bearings and carrying either a

chuck or a faceplate, to which the workpiece is clamped. The movement of the tool, both along the lathe bed and at right angle to it, can be accurately controlled, so enabling a part to be machined to close tolerances. Modern lathes are often under numerical control.

A lathe /'leiő/ is a machine tool which rotates the workpiece on its axis to perform various operations such as cutting, sanding, knurling, drilling, or deformation, facing, turning, with tools that are applied to the workpiece to create an object which has symmetry about an axis of rotation. Lathes are used in woodturning, metalworking, metal spinning, thermal spraying, parts reclamation, and glass-working. Lathes can be used to shape pottery, the best-known design being the potter's wheel. Most suitably equipped metalworking lathes can also be used to produce most solids of revolution, plane surfaces and screw threads or helices. Ornamental lathes can produce threedimensional solids of incredible complexity. The workpiece is usually held in place by either one or two centers, at least one of which can typically be moved horizontally to accommodate varying workpiece lengths. Other work-holding methods include clamping the work about the axis of rotation using a chuck or collet, or to a faceplate, using clamps or dogs. Examples of objects that can be produced on a lathe include candlestick holders, gun barrels, cue sticks, table legs, bowls, baseball bats, musical instruments (especially woodwind instruments), crankshafts, and camshafts.

General understanding

- 1. What are machine-tools used for?
- 2. How are most machine-tools driven nowadays?
- 3. What facilities have all machine-tools?
- 4. How are the cutting tool and the workpiece cooled during machining?
- 5. What other machining methods have been developed lately?
- 6. What systems are used now for the manufacture of a range of products without the useof manual labour?
- 7. What parts can be made with lathes?
- 8. How can the cutting tool be moved on a lathe?

- 9. How is the workpiece clamped in a lathe?
- 10. Can we change the speeds of workpiece rotation in a lathe?
- 11. What is numerical control of machine tools used for?

Task 1. Find English equivalents in the text:

- 1. обрабатываемый материал Ishlov beriladigan material;
- Электропривод elektriprivod;
- 3. более точный juda aniq;
- 4. отдельные детали alohida detallar;
- 5. процесс массового производства ommaviy ishlab chiqarish jarayoni;
- приспособления для держания резца и детали kesguvchi va detalni ushlab turishga moslashish;
- операции по механической обработке детали detalga mexanik ishlov berish jarayoni
- 8. высоковольтный разряд yuqori voltli razryad;
- 9. сверление ультразвуком ultra- tovush bilan burg'ulash;
- 10. резание с помощью лазерного луча lazer nurlari yordamida;
- гибкие производственные системы -- egiluvchan ishlab chiqarish tizimlari;
- 12. детали круглого сечения aylanma kesishma detali;
- поворачивать деталь вокруг ее оси detalnii bo'ylab burmoq(qayirmoq);
- двигать в сторону, двигать по направлению к детали bir tomonga harakatlantirish, detal yo'nalishiga ko'ra harakatlantirish;
- 15. глубина резания kesish chuqurligi;
- 16. непрерывное вращение детали detalning uzluksiz aylanishi;
- 17. движение резца вдоль станины stanina bo'ylab kesgich harakati.

Task 2. Translate into English.

- Токарный станок позволяет производить детали круглого сечения. Tokarlik dastgohi aylanma kesishuvchi detallarni ishlab chiqarish imkonini beradi.
- 2. Деталь зажимается в патроне или на планшайбе токарного станка. Detal tokarlik dastgohining patron yoki planshaybasida siqiladi.

- Резец может двигаться как вдоль станины, так и под прямым углом к ней. Kesgich stanina bo'ylab qanday harakatlansa unga to'g'ri uchli shunday harakatlanishi mumkin.
- Современные токарные станки часто имеют цифровое управление. Zamonaviy tokarlik dastgohlari ko'pincha raqamli boshqaruvga ega.

Task 3. Put the verbs given in parentheses in the correct form: 1. Lathes (to be use) in woodturning, metalworking, metal spinning, thermal spraying, parts reclamation, and glass-working.

2. Lathes can be (to use) to shape pottery, the best-known design being the potter's wheel.

3. Most suitably equipped metalworking lathes can also be (to use) to produce most solids of revolution, plane surfaces and screw threads or helices.

4. Ornamental lathes can (to produce) three-dimensional solids of incredible complexity.

5. The workpiece (to be) usually held in place by either one or two centers, at least one of which can typically be moved horizontally to accommodate varying workpiece lengths.

6. Other work-holding methods (include) clamping the work about the axis of rotation using a chuck or collet, or to a faceplate, using clamps or dogs.

 Examples of objects that can be (to produce) on a lathe include candlestick holders, gun barrels, cue sticks, table legs, bowls, baseball bats, musical instruments (especially woodwind instruments), crankshafts, and camshafts.

Task 4. Match

- 1. lathea) device consisting of a piece of machinery2. leverb) machine tool in which metal that is secured to a3. lubricatorcarriage is fed against rotating cutters that shape it4. machinec) a machine tool for shaping a piece of rotating5. machinerywood or metal
- 6. mechanismd) a simple machine giving a mechanical advantage7. milling machineon a fulcrum

e) a substance capable of reducing friction by making surfaces smooth or slippery f) a mechanical or electrical device that transmits energyg) mechanical or electrical devices collectively

Answer the questions

- 1. What is lathe?
- 2. Why is it used?
- 3. What parts can be made with lathe?
- 4. How can the cutting tool be moved on a lathe?
- 5. How is the workpiece clamped in a lathe?
- 6. What objects can be produced?
- 7. What kind of lathes can produce three-dimensional solids of incredible complexity?



Unit 5. Lesson 2. Text: Welding

Active vocabulary	0-	
to join	source O	wire
pressure welding	gas welding	rod
heat welding	arc welding	to melt
instead	resistance welding	joint
bolting	tip	advantage
riveting	laser welding	to require
basic	electron-beam	surface
to manufacture	welding	coated
to depend	flame	flux
purpose	edge	fusible
available	simultaneously	to shield
equipment	filler	touching



WELDING»

Welding is a process when metal parts are joined together by the application of heat, pressure, or a combination of both. The processes of welding can be divided into two main groups:

- · pressure welding, when the weld is achieved by pressure and
- heat welding, when the weld is achieved by heat. Heat welding is the most common welding process used today.

Nowadays welding is used instead of bolting and riveting in the construction of many types of structures, including bridges, buildings, and ships. It is also a basic process in the manufacture of machinery and in the motor and aircraft industries. It is necessary almost in all productions where metals are used.

The welding process depends greatly on the properties of the metals, the purpose of their application and the available equipment. Welding processes are classified according to the sources of heat and pressure used.

The welding processes widely employed today include gas welding, arc welding, and resistance welding. Otherjoining processes are laser welding, and electronbeam welding.

Gas Welding

Gas welding is a non-pressure process using heat from a gas flame. The flame is applied directly to the metal edges to be joined and simultaneously to a filler metal in the form of wire or rod, called the welding rod, which is melted to the joint. Gas welding has the advantage of using equipment that is portable and does not require an electric power source. The surfaces to be welded and the welding rod are coated with flux, a fusible material that shields the material from air, which would result in a defective weld.

Arc Welding

99

Arc-welding is the most important welding process for joining steels. It requires a continuous supply of either direct or alternating electrical current. This current is used to create an electric arc, which generates enough heat to melt metal and create a weld.

Arc welding has several advantages over other welding methods. Arc welding is faster because the concentration of heat is high. Also, fluxes are not necessary in certain methods of arc welding. The most widely used arc-welding processes are shielded metal arc, gas-tung- sten arc, gas-metal arc, and submerged arc.

Shielded Metal Arc

In shielded metal-arc welding, a metallic electrode, which conducts electricity, is coated with flux and connected to a source of electric current. The metal to be welded is connected to the other end of the same source of current. An electric arc is formed by touching the tip of the electrode to the metal and then drawing it away. The intense heat of the arc melts both parts to be welded and the point of the metal electrode, which supplies filler metal for the weld. This process is used mainly for welding steels.

General understanding

- 1. What do the welding processes of today include?
- 2. What are the principles of gas welding?
- 3. What kinds of welding can be used for joining steels?
- 4. « What does arc welding require?
- 5. What is the difference between the arc welding and shielded-metal welding?

Task 1. Find the following words and word combinations in the text:

- 1. сварка давлением; bosim bilan payvandlash
- 2. тепловая сварка; issiqlik bilan payvandlash
- 3. болтовое (клепаное) соединение; boltli () birlashtirish
- процесс сварки; payvandlash jarayoni
- 5. зависеть от свойств металлов; metalning xususiyatiga bog'liq bo'lmoq
- 6. имеющееся оборудование; mavjud jiboz
- 7. сварочный электрод; payvandlash elektrodi
- 8. плавкий материал; silliq material

- 9. дефектный сварной шов; kamchilikli payvandlash hoshiyasi
- непрерывная подача электрического тока; uzluksiz elektr tokining uzatilishi

11. электрическая дуга; elektli

12. Источник электрического тока. Elektr toki manbai

Task 2. Read the new words and find the definition for them.

Welding metal parts application of heat

pressure a combination bolting and riveting

Task 3. True/False statements.

1. Welding is a process when metal parts are joined together by the application of heat, pressure, or a combination of both. T _____F

 Nowadays welding is used instead of bolting and riveting in the construction of many types of structures, including bridges, buildings, and ships.
 T F

3. It is also a basic process in the manufacture of machinery and in the motor and aircraft industries. T ____ F ____ V

It is necessary almost in all productions where metals are used.
 T F

5. The welding process depends greatly on the properties of the metals, the purpose of their application and the available equipment. T F

6. Welding processes are classified according to the sources of heat and pressure used. T F



Task 4. Put the verbs given in parentheses in the correct form:

1. It (to be) necessary almost in all productions where metals are used.

2. The welding process (to depend) greatly on the properties of the metals, the purpose of their application and the available equipment.

3. Welding processes (to be to classify) according to the sources of heat and pressure used.

4. The welding processes widely employed today (to include) gas welding, arc

welding, and resistance welding.

5. Otherjoining processes (to be) laser welding, and electron-beam welding.

6. Welding (to be) a process when metal parts are joined together by the application of heat, pressure, or a combination of both.

7. The most widely used arc-welding processes (to be shield) metal arc, gas-tungsten arc, gas-metal arc. and submerged arc.

Answer the questions

1. How can a process of welding be defined?

- 2. What are the two main groups of processes of welding?
- 3. How can we join metal parts together?
- 4. What is welding used for nowadays?
- 5. Where is welding necessary?
- 6. How is an electric arc formed?
- 7. Arc welding has several advantages over other welding methods. Why is arc welding faster?

ELECTRICITY AND MAGNETISM



Across

2. a temporary magnet that uses electricity to produce magnetism

7 a devise that uses magnetism to convert energy of motion into electrical energy

8 the two areas on a magnet where the magnetic force is greatest

9 the pathway that an electric current follows

10 material that can carry electricity or heat

11 a device that turns chemical energy into electrical energy

13 an electric charge that builds up on a material a circuit in which the parts are connected so that the electric current passes through each part along a single pathway

Down

1. material taht resist the flow of electricity or heat

3. a circuit in which parts are connected so that the electric current passes along more than o ne pathway

a continuous flew of electric charges

tiny particles that carry units of electricity

an object that attracts iron and certain other materials

12. a device that changes electrical energy into energy of motion

Unit 5. Lesson 3. Text: Other types of welding

Active Vocabulary:

gas-tungsten	carbon dioxide	arc
inert	droplet	sheet
edge	liquid	fusible
bare	beneath	granular
rate	layer	semi-automatic
gas-metal arc	weld seam	to create
considerably	resistance	to submerge
surrounding	clamp	



Non-Consumable Electrode Arc welding

As a non-consumable electrodes tungsten or carbon electrodes can be used. In gas-tungsten arc welding a tungsten electrode is used in place of the metal electrode used in shielded metal-arc welding. A chemically inert gas, such as argon, helium or carbon dioxide is used to shield the metal from oxidation. The heat from the arc formed between the electrode and the metal melts the edges of the metal. Metal for the weld may be added by placing a bare wire in the arc or the point of the weld. This process can be used with nearly all metals and produces a high-quality weld. However, the rate of welding is considerably slower than in other processes.



Gas-Metal Arc

In gas-metal welding, abare electrode is shielded from the air by surrounding it with argon or carbon dioxide gas and sometimes by coating the electrode with flux. The electrode is fed into the electric arc. and melts off in droplets that enter the liquid metal of the weld seam. Most metals can be joined by this process.





Submerged-arc welding is similar to gas-metal arc welding, but in this process no gas is used to shield the weld. Instead of that, the arc and tip of the wire arc submerged beneath a layer of granular, fusible material that covers the weld seam. This process is also called electroslag welding. It is very efficient but can be used only with steels.

Resistance Welding

In resistance welding, heat is obtained from the resistance of metal to the flow of an electric current. Electrodes are clamped on each side of the parts to be welded, the parts are subjected to great pressure, and a heavy current is applied for a short period of time. The point where the two metals touch creates resistance to the flow of current. This resistance causes heat, which melts the metals and creates the weld. Resistance welding is widely employed in many fields of sheet metal or wire manufacturing and is often used for welds made by automatic or semi-automatic ['semi otomatik] machines especially in automobile industry.



General understanding:

- 1. What is submerged arc welding?
- 2. What is the principle of resistance welding?
- 3. Where is semi-automatic welding employed?

Task 1. Translate into English:
- 1. Вольфрамовый электрод; volframli elektrod
- 2. инертныйгаз; inert gazi
- 3. окисление; kimyoviy yemirilish
- высококачественный сварочныйшов; yuqori sifatli payvandlash hoshiyasi
- 5. скорость сварки; payvandlash tezligi
- 6. аргон, гелий, углекислый газ
- 7. жидкий металл; suyuq metal
- Слой плавкого материала в виде гранул; donador ko'rinishdagi silliq metal qavati
- 9. листовой металл; list(varaq)limetal
- полуавтоматические сварочные станки. Yarim avtomatli payvandlash dastgohi

Task 2. Translate:

 In resistance welding, heat is obtained from the resistance of metal to the flow of an electric current. Qarshilikli payvandlashda metallning elektr toki oqimiga qarshiligidan issiqlik olinadi.

2. The heat from the arc melts the edges of the metal. Yoydan chiqqan issiqlik metallning chetlarini eritadi. A bare electrode is shielded from the air by surrounding it with argon or carbon dioxide gas. Yalang'och elektrod havodan argon yoki karbonat angidrid gazi bilan o'rab olinadi

3. Submerged-arc welding is similar to gas-metal arc welding. Botiq-yoyli payvandlash gaz-metall yoyli payvandlashga o'xshaydi

4. Electrodes are clamped on each side of the parts to be welded. Payvandlanadigan qismlarning har bir tomoniga elektrodlar mahkanılanadi

5. Resistance causes heat which melts the metals and creates the weld. Qarshilik metallarni eritib, payvandni yaratadigan issiqlikni keltirib chiqarishga sabab bo'ladi.

Task 3. Put the verbs given in parentheses in the correct form:

1. In gas-metal welding, abare electrode (to be shielde) from the air by surrounding it with argon or carbon dioxide gas and sometimes by coating the electrode with flux.

2. The electrode (to be feed) into the electric arc, and melts off in droplets that enter the liquid metal of the weld seam.

3. Most metals can be (join) by this process.

4. Submerged-arc welding (to be) similar to gas-metal arc welding, but in this process no gas is used to shield the weld.

5. Instead of that, the arc and tip of the wire (to be submerge) beneath a layer of granular, fusible material that covers the weld seam.

6. This process (to be also call) electroslag welding.

7. It is very efficient but can be (use) only with steels.

Task 4. Match.

1. arc	b) a joint that is	made b	by welding	two pieces of
2. arc welding	metal together			

- 3. electrodec) a line where two pieces of metal, wood etc have4. tungstenbeen joined together
- 5. seamd) a hard metal that is used to make steel and in the6. weldthin wires in electric light bulbs

7. wire

e) a small piece of metal or a wire that is used to send electricity through a system or through a person's body

f) a special toola curved shape or line; part of a curved line or a circle

 a) thin metal in the form of a thread, or a piece of this g)a method of joining two pieces of metal together by heating them with

Answer the questions.

- 1. What is the difference between the arc-welding and non-consumable electrode arc welding?
- 2. What are the disadvantages of the non-consumable electrode arc welding?
- 3. How is electrode protected from the air in gas- metal arc welding?

INPUT DEVICES CROSSWORD PUZZLE



Across

1. select with mouse or keyboard

3. new document that you already worked on

4. moving the mouse moves this across the screen

6. quickly pressing the mouse button once

12. plu into an audiojack

15. a primary display screen

17. random memory restored

18. a blinking line found on a computer screen

19. a list mof progrtams is often called

20. an output device that produces paper copy

22. type writer that contains the keys

Down

- 2. A long, narrow computer key
- 5. a device can send a picture from piece of paper to a computer screen
- 7. a small picture found on a computer screen
- 8. inserted to USB for storage
- 9. an input device that looks like a typewriter
- 10. a row of selected buttons and icons
- 11. type of stiye and size
- 13. operating system that controls some ascpets of the computer
- 14. device looks like a small animal
- 16. a device for computer games
- 21. memory that is read only

Unit 6. Lesson 1. Text: Automation.

Active Vocabulary

Automation the system of manufacture performing certain tasks previously done by people by machines only The sequences of operations are controlled automatically The most familiar example a highly automated system an assembly plant for automobiles or other complex products describe nonmanufacturing systems

automatic devices

can operate independently of human control

automated control systems



«AUTOMATION»

Automation is the system of manufacture performing certain tasks, previously done by people, by machines only. The sequences of operations are controlled automatically. The most familiar example of a highly automated system is an assembly plant for automobiles or other complex products.



The term automation is also used to describe nonmanufacturing systems in which automatic devices can operate independently of human control. Such devices as automatic pilots, automatic telephone equipment and automated control systems are used to perform various operations much faster and better than could be done by people.



Automated manufacturing had several steps in its development. Mechanization was the first step necessary in the development of automation. The simplification of work made it possible to design and huild machines that resembled the motions of the worker. These specialized machines were motorized and they had better production efficiency.

Industrial robots, originally designed only to perform simple tasks in environments dangerous to human workers, are now widely used to transfer, manipulate, and position both light and heavy workpieces performing all the functions of a transfer machine.

In the 1920s the automobile industry for the first time used an integrated system of production. This method of production was adopted by most car manufacturers and became known as Detroit automation.



The feedback principle is used in ail automatic-control mechanisms when machines have ability to correct themselves. The feedback principle has been used for centuries. An outstanding early example is the flyball governor. invented in 1788 by James Watt to control the speed of the steam engine. The common household thermostat is another example of a feedback device.

Using feedback devices, machines can start, stop, speed up, slow down, count. inspect, test. compare, and measure. These operations are commonly applied to a wide variety of production operations. Computers have greatly facilitated the use of feedback in manufacturing processes. Computers gave rise to the development of numerically controlled machines. The motions of these machines are controlled by punched paper or magnetic tapes. In numerically controlled machining centres machine tools can perform several different machining operations.



More recently, the introduction of microprocessors and computers have made possible the development of computer-aided design and computer-aided manufacture (CAD and CAM) technologies. When using these systems a designer draws a part and indicates its dimensions with the help of a mouse, light pen, or other input device. After the drawing has been completed the computer automatically gives the motions that direct machining centre to machine Another development using automation the flex. manufacturing systems A computer can be used to monitor and controlthe operation of the whole factory.

Automation has also had an influence on the of the economy other than manifacture small computers are used in systems oalleq word processor which are rapidly becoming a standard part of the modern office. They are used to edit texts, to type, letters and so on.

General understanding:

- 1. How is the term automation defined in the text?
- 2. What is the most "familiar example" of automation given in the text?
- 3. What was the first step in the development of automaton?
- 4. What were the first robots originally designed for?
- 5. What was the first industry to adopt the new integrated system of production?
- 6. What is feedback principle?
- 7. What do the abbreviations CAM and CAD stand for?
- 8. What is FMS?
- 9. What industries use automation technologies?

Task 1. Find the following words and word combinations in the text:

1. автоматические устройства – avtomatik qurilmalar

- 2. автоматизированное производство-avtomatlashtirilgan ishlab chiqarish
- 3. выполнять простые задачи-oddiy topshiriqlarni bajarish
- 4. как легкие, так и тяжелые детали- ham yengil va ham og'ir detallar
- 5. интегрированная система производства- integrallashtirilgan ishlab chiqarish
- 6. принцип обратной связи- ikkitomonlama aloga prinsipi
- 7. механизм может разгоняться и тормозить- mexanizm tezlasha va sekinlasha oladi

 компьютер автоматически посылает команды- kompyuter avtomatik tarzda buyruq uzatadi

9. высокоавтоматизированная система-mukammal avtomatlashgan tizim

10. непроизводственная система-ishlab chiqarilmaydigan tizim

Task 2. True/False statements.

1. Automation is the system of manufacture performing certain tasks, previously done by people, by machines only. T F

2. The sequences of operations are controlled automatically. T _____ F

3. The most familiar example of a highly automated system is an assembly plant for automobiles or other complex products. T F

4. The term automation is also used to describe nonmanufacturing systems in

which automatic devices can operate independently of human control. T_F_5 . Such devices as automatic pilots, automatic telephone equipment and automated control systems are used to perform various operations much faster and better than could be done by people. T_F_5

6. Automated manufacturing had several steps in its development. T ____ F ____
7. Mechanization was the first step necessary in the development of automation.
T ___ F ____

Task 3. Put the verbs given in parentheses in the correct form:

1. Automated manufacturing (to have) several steps in its development.

2. Mechanization (to be) the first step necessary in the development of automation.

3. The simplification of work (to make) it possible to design and build machines that resembled the motions of the worker.

4. These specialized machines (to be motorize) and they (to have) better production efficiency.

5. Industrial robots, originally (to design) only to perform simple tasks in environments dangerous to human workers, are now widely used to transfer, manipulate, and position both light and heavy workpieces performing all the functions of a transfer machine.

6. In the 1920s the automobile industry for the first time (to use) an integrated system of production.

7. This method of production (to be adopt) by most car manufacturers and became known as Detroit automation.

Task 4. Match.

1. automated	a) the process of moving or the way that someone or
2. motion control	something moves
3. computer-integrated	b) a mechanized system or process now
manufacture	uses machines instead of people or animals
4. industrial product	c) the process of making or growing things to
5. mechanization	be sold, especially in large quantities
6. motion	d) a product for use in industry and business, rather
7. production	than by people for their own use

 e) when computers are used to plan, design, and make products f) a way of controlling a computer game, by using movements of your bodyg) using computers and machines to do a job, rather than people

COMPUTER CROSSWORD PUZZLE



Across

A group of files or documents that are stored together by a title on your computer.

The main circuit board of a computer that holds together many of the important components of a computer.

where you can find the physical components of an electronic device.

8. An disk that contains usually a video recording or computer data.

11. A brief comment or explanation.

12. A small picture on a computer screen that represents a program or function that can be opened.

15. A set of facts or figures that can be displayed through a computer, especially in columns.

16. An electronic device that can intensify-speeches, music, etc., and made audible throughout a room, hall, or the like.

18. A small device that is connected to a computer that you move with your hand to help you click on items on the computer screen.

19. where you can find the images on your electronic device.

Down

I. The set of ke\s that are used to type words on a computer or typewriter.

2. A machine that is used for printing documents, pictures, etc.

6. To look up something.

7. a computer program where you can look up and information on the internet.

9. A screen that displays an image that is being generated by a computer.

10. A special kind of cord that enables you to connect a computer to another device.

13. or the Central Processing Unit is the component of a computer system that processes and exchanges data with the peripherals.

14. Booting a computer system again usually due to a problem.

17. are on a keyboard to help you enter information on the computer.



Active Vocabulary:

automation	resemble	facilitate
previously	efficiency	punched
sequence	flyball governor	aid
assembly plant	steam engine	dimensior
nonmanufacturing	household	
device	thermostat	



Automation in industry

Many industries are highly automated or use automation technology in some part of their operation in communications and especially in the telephone industry dialling and transmission are all 4one automatically. Rail ways are also controlled by automatic which have sensors that detect carriages passing a particular point. In this way the moment and trains can be monitored.



Not all industries require the same degree of automation. Sales, agriculture: and sonae service industries are difficult to automate, though agriculture industry in become more mechanised. especially in the processing and packaging of foods.

The automation technology in manufacturing and assembly is widely used in car and other consumer product industries.

Nevertheless, each industry was its own automation that answers its particular production needs.



General understanding:

- 1. How is the term automation defined in the text?
- What is the most "familiar example" of automation given in the text?
- 3. What was the first step in the development of automaton?
- 4. What were the first robots originally designed for?
- 5. What was the first industry to adopt the new integrated system of production?
- 6. What is feedback principle?
- 7. What do the abbreviations CAM and CAD stand for?
- 8. What is FMS?

9. What industries use automation technologies?

Task 1. Find the following words and word combinations in the text:

- 1. автоматические устройства; avtomatik qurilma
- 2. автоматизированное производство; avtomatlashtirlgan mahsulot
- 3. выполнять простые задачи; oddiy topshiriqlarni bajarmoq
- как легкие, так и тяжелые детали; qanchalik yengil bo'lsa, shunchalik og'ir detal
- интегрированная система производства; ishlab chiqarishning mukammallashgan tizimi
- 6. принцип обратной связи;
- 7. механизм может разгоняться и тормозить;
- 8. компьютер автоматически посылает команды;
- 9. высокоавтоматизированная система; yuqori avtomatlashgan tizim

10. непроизводственная система; ishlab chiqarmaydigan tizim

ms Task 2. True/False statements

Almost all industries are highly automated or use automation technology in some part of their operation in communications and especially in the telephone industry dialling and transmission are all 4one automatically. T ____ F ___
 Rail ways are also controlled by automatic which have sensors that detect carriages passing a particular point. In this way the moment and trains can be monitored. T ____ F ___

3. Not all industries require the same degree of automation. T F

4. Sales, agriculture: and sonae service industries are difficult to automate, though agriculture industry in become more mechanised, especially in the processing and packaging of foods. T_____F___

 The automation technology in manufacturing and assembly is widely used in car and other consumer product industries. T____ F___

 Nevertheless, each industry was its own automation that answers its particular production needs. T_____F___

Task 3. Put the verbs given in parentheses in the correct form:

1. Many industries (to be) highly automated or use automation technology in

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some part of their operation in communications and especially in the telephone industry dialling and transmission are all 4one automatically.

2. Rail ways (to be also to control) by automatic which have sensors that detect carriages passing a particular point.

3. In this way the moment and trains (can to be monitor).

4. Not all industries (to require) the same degree of automation.

5. Sales, agriculture: and some service industries (to be) difficult to automate, though agriculture industry in become more mechanised, especially in the processing and packaging of foods.

6. The automation technology in manufacturing and assembly (to be widely to use) in car and other consumer product industries.

Task 4. Match.

1. nationalize an	a) make it owned by the state
industry	b) make it privately owned, rather than owned by
2. privatize an	the state
industry	c) control an industry so that it does not make unfair
3. regulate an	profits
industry	d) one of the most successful companies in a
4. an industry leader	particular industry
5. industry experts	e) people who know a lot about a particular industry
6. industry analysts	f) people who study a particular industry to see how
7. a captain of	it is developing
industry	g) someone who runs a large company and has a lot
8. trade and industry	of influence
	h) producing goods and buying and selling them

Technology Crossword Puzzle



Across

2. A device that feeds data into a computer, such as a keyboard or mouse.

5. The exclusive right, as recognized separately in each country, to publish and sell literary, artistic, or musical materials.

10. A software system that links topics on the screen to related information and graphics, which are typically accessed by a point-and- click method.

11. copy (data) from one computer system to another, typically over the Internet.

8. Usually consists of eight bits.

9. A measure of the amount of computational work that a computer system performs.

Down

1. Usually comprises the display device, circuitry, casing, and power supply.

An error, flaw, failure, or fault in a computer program or system that causes it to produce an incorrect or unexpected result or to behave in unintended ways.
 A client software program that runs against a Web server or other Internet server and enables a user to navigate the World Wide Web (WWW) to access and

display data.

6. The collection of physical parts of a computer system.

 Sending an email, posting photos on a social media site and using your webcam. A part of a computer system or network that is designed to block unauthorized access while permitting outward communication.

9. The combination of typeface and other qualities, such as size, pitch, and spacing.

12. Any computer-generated information displayed on screen, printed on paper or in machine readable form, such as disk and tape.

13. A word or group of words that act as a way to cross reference to other documents or files on the computer

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Unit 6. Lesson 3. Text: Types of automation

Active Vocabulary:



«TYPES OF AUTOMATION»

Applications of Automation and Robotics in Industry

Manufacturing is one of the most important application area for automation technology. There are several types of automation in manufacturing. The examples of automated systems used in manufacturing are described below.

1. Fixed automation, sometimes called "hard automation" refers to automated machines in which the equipment configuration allows fixed sequence of processing operations. These machines are programmed by their design to make only certain processing operations. They are not easily changed over from one product style to another. This form of automation needs high initial investments and high production rates. That is why it is suitable for products that are made in large volumes. Examples of fixed automation are machining transfer lines found in the automobile industry, automatic assembly machines and certain chemical processes.

2. Programmable automation is a form of automation for producing products in large quantities, ranging from several dozens to several thousand units at a time. For each new product the production equipment must be reprogrammed and changed over. This reprogramming and changeover take a period of non-productive time. Production rates in programmable automation are generally lower than in fixed automation, because the equipment is designed to facilitate product changeover rather than for product specialization. A numerical- control machine-tool is a good example of programmable automation. The program is coded in computer memory for each different product style and the machine-tool is controlled by the computer programme.

3. Flexible automation is a kind of programmable automation. Programmable automation requires time to re-program and change over the production equipment for each series of new product. This is lost production time, which is expensive. In flexible automation the number of products is limited so that the changeover of the equipment can be done very quickly and automatically. The reprogramming of the equipment in flexible automation is done at a computer terminal without using the production equipment itself. Flexible automation allows a mixture of different products to be produced one right after another.

General understanding:

1. What is the most important application of automation?

- 2. What are the types of automation used in manufacturing?
- 3. What is fixed automation?
- 4. What are the limitations of hard automation?
- 5. What is the best example of programmable automation?
- 6. What are the limitations of programmable automation?
- 7. What are the advantages of flexible automation?

8. Is it possible to produce different products one after another using automation technology?

Task 1. Find equivalents in English in the text:

- 1. сфера применения; go'lash (dastur) doirasi
- 2. фиксированная последовательность операций; operatsiyalarning qat'iy ketma-ketligi
- 3. автоматические сборочные машины; avtomatik yig'ish mashinalari
- 4. определенные химические процессы; ma'lum kimyoviy jarayonlar
- 5. станок с числовым программным управлением; raqamli boshqariladigan dastgoh (mashina)
 - 6. потерянное производственное время; yo'qotilgan ishlab chiqarish vaqti
 - 7. разнообразная продукция. turli mahsulotlar

Task 2. Explain in English what does the following mean:

- 5. programmable automation 1. automation technology
- 2. fixed automation
- 3. assembly machines 7. numerical-control machine-
- 4. non-productive time

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Task 3. Put the verbs given in parentheses in the correct form:

1. Manufacturing (to be) one of the most important application area for automation technology.

2. There (to be) several types of automation in manufacturing.

3. Fixed automation, sometimes called "hard automation" (to refer) to automated machines in which the equipment configuration allows fixed sequence of processing operations.

3. These machines (to be to program) by their design to make only certain

- 6. computer terminal
- tool

processing operations.

4. Programmable automation (to be) a form of automation for producing products in large quantities, ranging from several dozen to several thousand units at a time.

5. For each new product the production equipment must (to be to reprogram) and changed over. This reprogramming and changeover take a period of non-productive time.

6. The reprogramming of the equipment in flexible automation (to be to do) at a computer terminal without using the production equipment itself.

7. Flexible automation (to allow) a mixture of different products to be produced one right after another.

Task 4. True/False statement

1. Fixed automation, sometimes called "hard automation" refers to automated machines in which the equipment configuration allows fixed sequence of processing operations. T

These machines are not easily changed over from one product style to another.
 T F

3. This form of automation needs high initial investments and high production rates. T F

That is why it is suitable for products that are made in large volumes. T_____

4. Examples of fixed automation are machining transfer lines found in the automobile industry, automatic assembly machines and certain chemical processes. T_F_

5. Production rates in programmable automation are generally lower than in fixed automation, because the equipment is designed to facilitate product changeover rather than for product specialization. T F

6. A numerical- control machine-tool is a good example of programmable automation.

7. The program is coded in computer memory for each different product style and the machine-tool is controlled by the computer programme. T

8. Programmable automation requires time to re-program and change over the production equipment for each series of new product. T___F___

9. In flexible automation the number of products is limited so that the changeover of the equipment can be done very quickly and automatically. T___F___
10. The reprogramming of the equipment in flexible automation is done at a computer terminal without using the production equipment itself. T__F___

Task 5

1. automation

a) the use of computers and machines instead of people to do a job
b) the equipment configuration allows fixed

2. fixed automation
 3. programmable

automation

4. flexible automation

5. hard automation

sequence of processing operations. c) a form of automation for producing products in

large quantities, ranging from several dozens to several thousand units at a time.

d) a kind of programmable automation.

e) form of automation needs high initial investments and high production rates.



Across

2. any interaction tat when unopposed, wi change tie moton of an object

4. a group of objects from which you can measure an object's position a motion

11. the object is supposed So cower equal (fctances in equal intervals of time

14. describes the movement of an object

15 the rate at which an object changes posfton

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20 a a force tiat acts at the point of contact between two objects

22. Do not cause a change in mofen- when balanced forces act on an object at rest the object wl not move

23 the feel, appearance, or consistency of a surface or a substance

24. a force appfed to an object by anotier body that is not in drect contact will it 25 a dimensionless quantity representing the amount of matter in a partde or object

26. Faces that cause a change in the motion of an object

Down

1. the product of mass muftipied by velocity

3. the resistance that one surface or object encounters when mewing over another

5. a physical phenomenon produced by tie motion of electric charge, resting in

attractm and repulsive forces between objects

6. ncrease of speed or velocity

7. the paver to float or nse in a fluid

8. a change in the position of an object

9. a force that is caused by air that acts in the opposite drecton to an object

10. The total area of the surface of a three^mensional object

12. a system of units fa expressing heaviness a mass

13. the process a technique employed to reduce friction between, and wear of one

a bofi. surfaces in proximity and mewing relative to each other

16. location erf an object

17. the property of matter by which it retains its state of rest or *s velocity along a straight ine so long as it is not acted upon by an external force

18. the force that attracts a body toward the center of the earth, or toward any other physical body having mass

19. the speed and drection an object is mowng

21. how far an object moves during a certain amount of time

Additional Materials Additional Reading Texts. Technology

We live in the era of high technologies, and we use modern inventions in our everyday life because they have brought us much comfort. New technologies have spread on every field over the past 15 years. Moreover, they are rapidly changing. For example, video-recorders, DVD-players or compact disks have already become obsolete and have been replaced by more up-to-date devices. Today we can hardly imagine our life without such modern mobile devices as cell phones or laptops. Our offices are fully equipped with computers, printers, scanners, air-conditioners, interactive whiteboards and wi-fi moderns. Household appliances (vacuum-cleaners, coffee-machines, dish-washers, food processors and others) help us to save our time and energy.

However, we should realize that digital and electronic inventions have both negative and positive impact on our daily life.

New technologies or gadgets are making things faster, easier, more comfortable and interesting. For instance, if you install a GPS (Global Positioning System) in your car you'll never get lost again. And could we imagine just 15 years ago all the things we can do on the wireless Internet nowadays: connecting with friends from all over the world, online shopping and banking, distance online learning, finding virtual relationships and even working from home? Isn't that awesome?! Our parents used to go to post-offices to send letters or pay bills, they went to libraries to find a good book and they used telephone-booths for phone-calls.

On the other hand, I know some people who are strongly against some modern inventions because they really miss those days when they talked to each other face to face in reality, and not virtually. I partially agree with that as I really believe that people are becoming anti-social and too dependent on their gadgets. Some of my friends also spend half of the time occupying their shiny gadgets (smart-phones or i-pads) even when we go out together. Besides, people who use various social networks a lot (such as Facebook or Instagram) should worry more about their privacy.

There are serious arguments both for and against the use of new technologies but anyway it's really difficult to imagine our life without them today.

Modern technologies

People can hardly imagine their lives without modern technologies nowadays. It is almost impossible to go out without a mobile phone or an MP3 player, for example. These devices have become an important part of our life. Moreover, almost every day either a new technology is being invented or an old one is being improved. To stay up-to-date people keep buying newer items. Soon our houses and work places will look like electronic stores. Technology is all around us. First of all, we need it for work. All modern offices are equipped with computers, scanners, printers, and other useful machines. One of the most important devices today is the wi-fi modem as it provides Internet. Secondly, technologies surround us at home, in cars and everywhere. It includes TVs, radios, refrigerators, vacuum-cleaners, washing machines, CD-players, e-books, cameras and else, Perhaps, the most important thing about technological progress is that it allows us to do many things which would be impossible without it. For example, we can communicate with friends from other countries with the help of computers. We can even see them and have a live conversation. There are many people who are against new technologies. In my opinion, technological progress has made our lives more interesting and bright. Thanks to computers and Internet 1 find more educational resources. Such electronic items as vacuum-cleaner, washing machine, microwave, dish washer, blender and some others have made my mum's life easier. So I'm sure that new technologies are for good. The technological progress continues and it moves rather fast. Thus, I think that soon we will live in 'smart' houses with robots doing all housework instead of us.

Science and Technology

In recent years, scientific and technological developments have drastically changed life on our planet as well as our views both of ourselves as individuals in society and of the Universe as a whole.

Today, science and technology are closely related. Many modern technologies such as nuclear power and space flights depend on science and the application of scientific knowledge and principles. Each advance in pure science creates new opportunities for the development of new ways of making things to be used in daily life. In turn, technology provides science with new and more accurate instruments for its investigation and research.

Technology refers to the ways in which people use discoveries to satisfy needs and desires, to alter the environment, to improve their lives. Throughout human history, men and women have invented tools, machines, materials and techniques, to make their lives easier.

Of course, when we speak of technology today, we are looking at it in a much narrower sense. Generally, we mean industrial technology, or the technology that began about 200 years ago with the development of power-driven machines, growth of the factory system, and mass production of goods that has created the basis for our modern society. Today we often say that we live in an age of science and technology. According to one estimate, 90% of all the scientists who ever lived, were alive and active in the 1970-s. This increased scientific activity has brought new ideas, processes, and inventions in ever-growing amount. The scientific revolution that began in the 16th century was the first time that science and technology began to work together. Thus, Galileo, who made revolutionary discoveries in astronomy and physics, also built an improved telescope and patented a system of lifting water. However, it was not until the 19th century that technology truly was based on science and inventors began to build on the work of scientists. For example, Thomas Edison built on the early experiments of Faraday and Henry in his invention of the first practical system of electrical lighting. So too, Edison carried on his investigations until he found the carbon filament for the electric bulb in a research laboratory. This was the first true modern technological research.

In a sense, the history of science and technology is the history of all humankind.

Science and Technology

We are living in a world of technologies now and can't remember our life being different. The humanity has made many discoveries and invented lots of mechanisms and devices which have simplified our life significantly.

We got acquainted with light and sound and explored their characteristics which helped us to use them effectively. The radio, the TV, the telephone was invented and enabled us to get in touch with each other, learn about what is happening in our native city and all over the world.

The humanity never stopped on the way to unexplored places and even planets! We devised a satellite and made a rocket to travel to the moon and round the Earth. Special equipment lets us make photos of the faraway planets and study their environment.

The most recent breakthrough in technology is supposed to be the internet. It has broadened our abilities and opened new horizons. We connect with people from other countries without any problems, search for any information and get it in one click, and have many other opportunities accessing the net from our smartphones. tablets, and computers.

However, other realms of science have also been developing. Medicine, biology, archeology and many other sciences have achieved great results. We do have everything to maintain a high quality of life now. Many processes have been automated and people have got rid of many unpleasant things and difficulties they used to face in the past.

Technology Definition

Technology has revolutionised global communication.

Word	Meaning	Example
technology	the application of scientific discoveries for practical purposes, especially in industry.	Technology is advancing at such a rate that it's difficult to imagine what our lives will be like in 20 years time.
technological	relating to or involving technology.	Recent technological advances in computing and telecommunications mean that some of our staff work mainly from home and don't need to travel into the office every day.
technophile	a person who is eathusiastic about new technology.	My brother is a true technophile and can tell you about every new gadget on the market.
a techic	a person who knows a lot about technology, especially computers or other electronic equipment.	I'm not surprised Sue I.in is working for a top computer agency as she was always a real techie at school.
tech-savvy	well informed about or proficient in the use of modern technology, especially computers.	My kids are far more tech-savvy than I am, having grown up with computer technology.
technophobe	a person who fears or dislikes new technology, especially computers, and does not want to use it.	I keep telling him how easy it is to send an email but he's an ardent technophobe and refuses to even have a go.

	T C C THOM	V Dett Hooli
Word	Menning	Example
progress	to develop towards an improved or more advanced state.	The pace of technological progress over the past 20 years has been astonishing.
innovation	the development and use of a new idea or method.	Further Innovation is needed in the farming industry if we are to be able to feed ourselves in the future.
innovative	the adjective form of innovation.	Guti was a much-valued member of the team as he often came up with innovative solutions to a problem.
an advance	a development or improvement.	Scientists have made major advances in recent years in their search for a cure for Alzheimer's.
develop	to change into a stronger or more advanced form.	I can confidently predict that computers will continue to develop at a rapid rate.
development	the process of developing something.	Future developments in space travel may mean that our ancestors live on other planets.
revolutionary	involving or causing a complete or dramatic change and improvement.	The development of personal computers has proved revolutionary for business owners.
revolutionise	to radically change something so it is much better.	There's no doubt that computers have revolutionised our lives.
breakthrough	important development or	Some people argue that the invention of the

Technology Definition

	discovery.	internal combustion engine was the most important technological breakthrough of all time.
modern	of the present time; using recent ideas and methods.	Modern science is transforming the way we understand our world.
modify	to change something in order to make it better.	Being disabled, I need a car that can be modified to meet my specific needs.
cutting-edge	very modern.	Our new mobile phone is still in development but it is at the cutting-edge of technology.
state-of-the- art	the latest stage of development of a product, using the most recent ideas and method and including the latest features.	The new aircraft design was state-of-the- art and was expected to revolutionise passenger's experience of flying.
advanced	modern and well developed.	In the developing world, simple technologies such the mechanical water pump are often more practical solutions to everyday problems than the advanced computer technologies of the western world.
high tech	using or involving advanced technology.	Some high tech solutions are less reliable than the basic technology they replace.
Indispensable	something you could not manage without; absolutely necessary.	For many people, their mobile phone is indispensable .
outdated	out of date; old-fashioned.	Sherzod didn't want to buy a new iPhone but his mubile looked so outdated compared to those of his friends that he felt pressured into updating it.
obsolete	not in use any more, having been replaced by something better.	Jerry had to close down his small printing business as his old printer had become obsolete and he couldn't afford to replace it with the latest state-of-the-art equipment.

Technology	Kocabulary	Set	3:	Effect

Word	Meaning	Example
impact	the effect of something.	Modern technology has had a massive impact on the way we communicate with each other.
to transform	to markedly or dramatically change.	There can be no denying that computers have transformed the way we work and study.
game changer	a new idea or factor that significantly changes an existing situation or way of doing something.	The professor's new theory was a game changer and if proved correct, brought the possibility of time travel one step closer.
affect	to influence or cause a change in something.	Social media has radically affected both how we communicate and who we communicate with.
influence	the power to have an effect on the character, development or behaviour of someone or something.	The influence of modern technology is evident in almost every aspect of our daily lives from how we shop to how we spend our leisure time.

Technology Vocabulary Set 4: Computers		
Word	Meaning	Example

computer literate	to have sufficient knowledge and understanding to be able to use a computer effectively	The application form specified that candidates must be computer literate to be considered for the job.
computer buff	someone who knows a lot about computers and might be considered an expert.	Although I have a good understanding of the software I use at work, I certainly wouldn't call myself a computer buff.
laptop	portable computer.	With a laptop, I can work almost anywhere as long as I have an internet connection.
PC	personal computer; not usually portable like a laptop.	I have a PC in my office at work but prefer a laptop for home so that I can use it in different locations around the house.
to beat up	to start a computer.	Of course I'll show you how to send an email. You boot up the computer and I'll be with you in a minute.
word processing	the process of producing, editing and storing text on a computer.	I have to write a lot of reports for my job so word processing is what I use my computer for more than anything else.
to upgrade	to obtain a more powerful or feature-rich computer, electronic device or piece of software.	My mobile phone company is always trying to persuade me to upgrade to the latest model.
software	the programmes and other operating information used by a computer and related devices.	Bella was able to create some amazing photographic effects after installing the new aoftware on her computer.
hardware	the physical parts of a computer and related devices.	Computer hardware includes the monitor, keyboard, disk drive, mouse and wiring.
to crash	to suddenly stop working.	Guti was in the middle of his online English lesson when his computer crashed.

Technology Vocabulary Set 5: The internet

Word	Meaning	Example
internet	the extensive global system of connected computers that allows people to share information and communicate with each other.	I love the flict that I can get free English lessons on the internet
to surf the internet	to look at a series of websites one after the other.	I spent hours surfing the internet searching for the best holiday deals
online	connected to the internet.	Most of my friends do their grocery shopping online but I prefer to go to the supermarket and choose my food items myself.
website	a set of pages of information on the internet about a particular subject, published by a single person or organization.	I found an excellent website about how to train puppies the other day.
to browse	to look for and look at information on the internet.	l often browse the internet for gift ideas when a friend has a birthday coming up.
wifi	using radio or microwaves rather than wires to connect to the internet.	Having a will connection gives me so much more freedom in the way I work as I'm no longer tied to my desk.
wifi hotspot	an area with an accessible wireless network, often a public place.	Whenever the ship was in port, the crew flocked to the nearest wifi hotspot to connect with their families back home.
internet	the link between a computer and the	There is such a poor internet

connection	internet.	connection where I live that I have to go to the library when I want to get online.
social media	websites and computer programmes such as Facebook or Twitter that allow people to connect and share content online.	I have to admit that I connect with my friends on social media more often than I see them face-to-face.
viral	an image, video or piece of information that becomes very popular very quickly on the internet.	The video of her cat riding on a giant tortoise went viral and achieve nearly a million views.
e-commerce	commercial transactions conducted electronically on the internet.	Their business really took off when they built an e-commerce website and started selling their products online.
e-book	a book published in digital form and read on a computer or other dedicated electronic device.	The best thing about e-books is that you can download them instantly and start reading them immediately.
privacy	the right to keep personal information secret.	Many internet users are very concerned about the privacy of their personal information.
censorship	suppressing or stopping certain information being available to the public	The Chinese have their own social media channels as government censorship means they can't access Facebook, Twitter or Instagram.
internet security	computer systems implemented or actions taken by computer users to protect their data while using the internet.	Internet security is a real concern for people making credit card purchases online.
Internet safety	computer systems implemented or actions taken by computer users to stay safe while using the internet.	I want to learn more about internet safety as I've heard many stories about children being befriended by paedophiles online and I want to protect my own kids
hacker	a person who illegally gains access to a computer system to steal information or tamper with the system.	Computer hackers cause huge disruption within the organisations they target and could even pose a threat to our country's security.
computer virus	a piece of code which is capable of copying itself and typically has a detrimental effect, such as corrupting the system or destroying data.	Timor's computer was infected with a computer virus and many of his files were damaged.
cyber	involving, using, or relating to computers, especially the internet.	Many business owners live in fear of a cyber attack, especially infection of their computer network with a virus.
cybersecurity	the measures taken to protect against the criminal or unauthorised access of electronic data.	Cybersecurity has become a major industry as computer hackers have become more and more skilled at breaking into supposedly secures computer systems.
cybercrime	criminal activities carried out by means of computers or the internet.	Identity theft, where someone steals and misuses your personal information, is one of the most common types of cybercrime .

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the second se			and the second second	ARTICLE ART.	and the second second

Word	Meaning	Example
device	a thing made or adapted for a particular purpose, especially a piece	A FitBit is a device that helps people improve their health by tracking their

	of mechanical or electronic equipment. It is usually quite small.	activity, exercise, food, weight and sleep.
labour-saving device	a device or piece of equipment that reduces the effort needed to do something.	The labour-saving device I'm most grateful for is my washing machine.
gadget	a small mechanical or electronic device or tool, often ingenious, novel or fun as well as being useful.	Paulo is always buying the latest gadget to go with his digital camera.
user-friendly	simple to understand and easy to use.	I didn't find my new mobile phone user- friendly at first but my grandson was able to show me how to use it and now I understand what to do.
microchip	a very small piece of silicon with electronic circuits on it that can hold large quantities of information or perform mathematical and logical operations.	One of the greatest technological breakthroughs of modern times was the development of the microchip.
the digital age	the time since personal computers were introduced and became central to people's lives.	I envy people born in the digital age as they've grown up with computers and seem to find it easier to adapt to new technologies than us older generation.
Al (artificial intelligence)	the development of computers or computer-controlled robots to perform tasks that normally require human intelligence.	Although AI is still largely confined to science fiction, some people believe there will come a time when computers will rule the world.
electronic	a device that operates by electric current passing through it.	Electronic games are extremely popular with both adults and children.
appliance	typically a piece of electrical equipment, such as a kettle or toaster, that uses less advanced technology.	Modern kitchen appliances make cooking and baking much easier than they would have been 100 years ago and save so much time.

Engineering Vocabulary

Words	Meanings
atmospheric pressure	the pressure exerted by the atmosphere
automation	the act of implementing the control of equipment
automaton	a mechanism that can move independently of external control
belt	loop of flexible material between rotating shafts or pulleys
combustion	a reaction of a substance with oxygen to give heat and light
composite	consisting of separate interconnected parts
compression	an increase in the density of something
compressor	a mechanical device that compresses gasses
conduction	the transmission of heat or electricity or sound

convection	transfer of heat caused by molecular motion in liquid or gas	
crank	a hand tool consisting of a rotating shaft with parallel handle	
cylinder	a chamber within which a piston moves	
deformation	alteration in the shape or dimensions of an object as a result of the application of stress to it	
dynamics	mechanics concerned with forces that cause motions of bodies	
efficiency	the ratio of the output to the input of any system	
clasticity	the tendency of a body to return to its original shape	
elongation	the act of lengthening something	
energy	the capacity of a physical system to do work	
engine	motor that converts energy into work or motion	
entropy	energy in a system no longer available for mechanical work	
factor of safety	the ratio of the breaking stress of a structure to the estimated maximum stress in ordinary use	
fatigue	a weakened state caused by long stress on a material	
filter	device that removes something from what passes through it	
first law of	the fundamental principle of physics that the total energy of an	
thermodynamics	isolated system is constant despite internal changes	
flow rate	the amount of fluid that flows in a given time	
friction	the resistance when a body is moved in contact with another	
fuel	a substance that can be consumed to produce energy	
fulcrum	the pivot about which a lever turns	
gear	a toothed wheel that engages another toothed mechanism	
grinder	machinery that processes materials by grinding or crushing	
heat	a form of energy transferred by a difference in temperature	
hydraulics	study of the mechanics of fluids	
inclined plane	a simple machine for elevating objects	
inelastic	not able to resume shape after stretching or compression	
internal combustion	the combustion of fuel inside a cylinder	
joule	a unit of electrical energy	

kinetic energy	the mechanical energy that a body has by virtue of motion	
lathe	a machine tool for shaping a piece of rotating wood or metal	
lever	a simple machine giving a mechanical advantage on a fulcrum	
lubricator	a substance capable of reducing friction by making surfaces smooth or slippery	
machine	a mechanical or electrical device that transmits energy	
machinery	mechanical or electrical devices collectively	
manufacturing	the act of making something (a product) from raw materials	
material	the substance that goes into the makeup of a physical object	
mechanical advantage	the ratio of the force exerted by a machine to the force applied to it	
mechanical	the branch of engineering that deals with the design and construction	
engineering	and operation of machinery	
mechanism	device consisting of a piece of machinery	
milling machine	machine tool in which metal that is secured to a carriage is fed against rotating cutters that shape it	
modulus of clasticity	(physics) the ratio of the applied stress to the change in shape of an elastic body	
moment	a turning force produced by an object acting at a distance	
momentum	the product of a body's mass and its velocity	
motion	the set of changing location from one place to another	
nanotechnology	engineering that involves manipulating atoms and molecules	
piston	mechanical device that has a plunging or thrusting motion	
pneumatics	the branch of mechanics that deals with the mechanical properties of gases	
potential energy	mechanical energy that a body has by virtue of its position	
power	(physics) the rate of doing work	
pressure	the exertion of force to a surface	
projectile	impelling or impelled forward	
pulley	a wheel with a groove in which a rope can run	
pump	a device that moves fluid or gas by pressure or suction	
quality control	maintenance of standards of quality of manufactured goods	

radiation	energy transmitted in the form of rays or waves or particles	
raw material	material suitable for manufacture or use or finishing	
reliability	the quality of being dependable	
reservoir	tank used for collecting and storing a liquid	
resilience	ability of a material to return to its original shape	
scrèw	a simple machine of the inclined-plane type consisting of a spirally threaded cylindrical rod that engages with a similarly threaded hole	
second law of	a law stating that mechanical work can be derived from a body only	
thermodynamics	when that body interacts with another at a lower temperature; any spontaneous process results in an increase of entropy	
simple machine	a device for overcoming resistance at one point by applying force at some other point	
speed	a rate at which something happen	
sprocket	tooth on the rim of gear wheel	
statics	the branch of mechanics concerned with forces in equilibrium	
strain	deformation of a body under the action of applied forces	
stress	(physics) force that produces strain on a physical body	
synthetic	not of natural origin; prepared or made artificially	
tensile strength	the strength of material expressed as the greatest longitudinal stress it can bear without tearing apart	
tension	a stress that produces an elongation of a physical body	
thermodynamics	physics concerned with heat and other forms of energy	
torque	a twisting force	
toughness	the elasticity and hardness of a metal object	
transmission line	a conductor for transmitting electrical or optical signals or electric power	
valve	a mechanical device for controlling the flow of a fluid	
variance	the quality of being subject to change	
velocity	distance travelled per unit time	
viscosity	resistance of a liquid to flowing	
volume	the amount of 3-dimensional space occupied by an object	

wedge	something solid that can be pushed between two things
wheel and axle	hoist so arranged that a rope unwinding from a wheel is wound onto a cylindrical drum or shaft coaxial with the wheel
work	a manifestation of energy
zeroth law of thermodynamics	the law that if two bodies are in thermal equilibrium with a third body then the first two bodies are in thermal equilibrium with each other

Daily used English vocabulary words for Industries

Vocabulary	Explanation	Example
A batch	A set, group.	There's a batch of papers on my desk.
A blueprint	An architectural plan.	The architects submitted a blueprint yesterday.
A bolt/to bolt	A fastener with nut/To attach something with a bolt.	The bolts are well fastened.
A broom	A tool used for sweeping.	Please use a broom to clean the floor.
A central heating	A system for heating a building.	There's central heating in my building.
A completion	The fact something is finished, ended.	The completion of the project is planned for the end of the week.
A container	Something which can hold elements, items, goods.	Where is the container for the recycling?
A contractor	An entrepreneur.	The contractor will devliver the project at the end of the month.
A craftsman	An artisan.	Our invitations were designed by a craftsman.
A developer	A person who develops real estate properties.	The developer is already thinking about a new project.
A fabric	A cloth.	What fabric did you use for this piece of clothing?
A facility	A service, a unit.	What facilities does your condominium offer?
A factory/plant	A manufacturing site.	Where is your factory situated?
A failure	An unsuccessful attempt, a deficiency.	Launching the new product was a failure.
A faucet	A water tap	The faucet is leaking so we need to call a plumber.
A forklift (truck)	A truck for lifting.	All the warehouse workers are certified to use forklift trucks.
A guideline	A line drawn as a guide.	We strictly respected the guidelines.
A handle	A doorknob, what	The door handle is broken so we can't

	enables to open and close a door.	shut down the door.
A hard- hat/helmet	What you put on your head to protect yourself from work.	Everyone should where a hard-hat when they're on the field.
A harm/To harm	To injure, to cause damage.	There's no harm asking questions.
A hazard	An accident.	We don't want any hazards to happen so we're extra cautious.
A lack/to lack	To be short of, to run out of.	He lacks experience but he'll be a good junior.
A ladder	A tool you have to climb on to access higher places.	The ladder is so high that it makes me scared.
A landscaper	A person who is in charge of designing landscapes, gardens.	The landscaper advised us to collect flowers before the dew.
A leak/to leak	An escaping fluid/when liquid escapes.	The faucet is leaking so we need to call a plumber.
A mechanic	A person who repairs machines.	The mechanic will have a look at our engine.
A mold (US)/mould (UK)	A shaped container.	The plastic item is built thanks to a mold.
A nationalized industry	An industry which has become public.	The main telephone provider could soon become a nationalized industry.
A part	A piece.	What part is deficient?
A pipe	A tube.	All the pipes take a lot of room.
A primary industry	An industry which is capital.	Nuclear power plants are a primary industry in France.
A provider	Someone who furnishes	Their IT provider will soon change as
/supplier	services/products.	they haven't been very efficient.
A roof	What covers the top of a building.	His roof is made of bricks.
A saw	To tool to cut.	They'll use a saw to cut the tree.
A	A tool used to tighten or	A screwdriver is necessary to build a
screwdriver	make something looser.	piece of furniture.
A secondary industry	An industry which is not as important as a primary one.	Steel is a secondary industry.
A service industry	An industry of services.	There are more and more jobs in the service industry.
A shelf (shelves plural)	A flat storage space.	There are too many books on the shelf. It'll either break or fall.
A shift/to	A working time zone/to	He works on night shifts only.

shift	change.	
A spare part	A replacement component.	She ordered a spare part to fix her car.
A stack/to stack	A pile/to pile up.	The stack of papers on her desk was finally sorted.
A storage	A place to stock.	The storage is very well organized in the warehouse.
A surveyor	A structural inspector.	How many surveyors will check the building?
A tank	A storage container for liquids.	My petrol tank is empty so I need to go to a gas station.
A threat/to threaten	A menace, intent to hurt/to menace.	The head of the administrative department made death threats to her.
A tool	An instrument.	What tools do you need to work in the bathroom?
A vent	Used for air or other gas.	The vent does not work properly so the room is very humid.
A warehouse	A space to store goods.	The storage is very well organized in the warehouse.
A welder	Someone who fuses metal.	The aeronautics industry needs welders.
A wire	A cable.	The wires of the house should be changed.
A wiring	Cabling.	All the house needs new wiring.
A workshop	A place with tools, a seminar usually about a technical issue	They worked on their project in the workshop to have all the necessary tools they needed
A	An office cubicle or	Her workstation is in the middle of the
workstation	desk	open place office
A wrench	A tool for bolts, a violent pull.	We need a wrench to finish the work properly.
An emergency	An urgent situation.	Fixing the window is an emergency as otherwise our house will be broken into.
An output	An amount produced.	How big was their output?
Construction	Works.	Her dad works in construction.
Dirt	What is not clean.	The dirt in cities partly results from pollution.
Dust	Particles of dirt.	Use a broom to remove the dust on the floor.
Efficiently	Done with efficiency.	They efficiently did the work so they can peacefully enjoy their holiday.
Forestry	Management of the forest.	The department of forestry seriously considers the weather forecast.
Hardware	Tools, metal items.	Do you have all the hardware you need?
Harmful	Which causes harm or injury.	Being on the field could be harmful so please wear a helmet.
Harmless	With is not dangerous.	It is not harmless to work in a plant.
Hazardous	Accidental.	What a hazardous end!

Iron	Metal.	Iron is quite commonly used.
Loose	Not tight.	The bolts are too loose.
Mandatory	Which is an obligation.	Respecting security rules is mandatory.
Power	Energy.	There's no more power in the factory so
Premises	A site.	The premises of the new agency are
		beautiful.
Raw	The opposite of cooked, crude.	In Japanese restaurants, you can eat raw fish.
Raw materials	Unprocessed substances.	Expensive raw materials are stored in a safe.
Rubber	Latex material.	Tires are made of rubber.
Safety	Security.	Safety is seriously considered in construction.
Steel	Metal.	My watch is made of steel.
To be compliant with	To respect rules.	My department is compliant with European regulations.
To break down	Not to work anymore, to stop functionning.	The machine suddenly broke down.
To carry out	To do, to make.	Who carried out the project?
To comply with	To respect rules.	You should comply with the internal rules of the company.
To dent	To damage metal.	He moved too fast with the machine and dented the material.
To dig	To turn soil with a spade, to excavate.	Dig your own tomb or we'll have to do it for you.
To dump	To discard: rubbish, trash.	We dumped everything in the bin.
To fix	To repair.	Fix my door and we'll be safe.
To manufacture	To make, produce.	Cars are manufactured in this factory.
To mend	То гераіт.	You have to mend the air conditioning or it'll be boiling hot in the building.
To operate (a machine)	To make (a machine) work.	They all learns how to operate the new device.
To perform	To enact.	How well did you perform?
To pour	To serve liqui	

Definition of Mechanical Properties of Materials

Mechanical properties	the physical properties of the material which describes its behaviour under the action of loads on it. There are many mechanical properties of materials and some key properties among them are given below.	
Strength	It is the capacity of the material to withstand the breaking, bowing, or deforming under the action of mechanical loads on it.	
Elasticity	It is the property of a material to come back to its original size and shape even after the load stops acting on it.	

Plasticity	It is the property of a material that makes it to be in the deformed size and share even after the lead stors acting on it	
Ductility	It is the property of a material that allows it to deform or make into thin wires under the action of tensile loads plastically	
Tensile strength	It is the property of a material that allows it to deform under tensile loading without breaking under the action of a load.	
Compression	It is a pressure causing a decrease in volume.	
Fatigue	It is the growth of cracks under stress. It occurs when a mechanical part is subjected to a repeated or cyclic stress, such as vibration.	

AUTOMATION DEFINITION VOCABULARY

automation	a mechanical device that functions automatically; the process of au tomating	
au tom a to	a mechanical figure that acts as if by its own power; robot;	
n	one who acts in a routine manner without apparent active intellige	
(ô-tŏm'ə-	nce	
tõn', -tən)	20	
	A self-operating machine or mechanism, especially a robot.	
	One that behaves or responds in a mechanical way.	
	The automatic operation or control of equipment, a process, or a sy stem.	
	The techniques and equipment used to achieve automatic operation or control.	
	The condition of being automatically controlled or operated.	
	the act or process of automating or making automatic.	
	the state of being automated.	
	the technique, method, or system of operating or controlling a proc ess by highly automatic means,	
	as by electronic devices, reducing human intervention to a minimu m.	
	1. (General Engineering) the use of methods for controlling industr ial processes automatically, esp by electronically controlled syste ms, often reducing manpower	
	2. (General Engineering) the extent to which a process is so contro lled	
automobilis m	the use or care of automobiles. — automobilist, n. — automobility, n.	
bionics	1. the science or study of how man and animals perform tasks and solve certain types of problems involving use of the body.	
	2. the application of this study to the design of computer-	
	driven and other automated equipment.	

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	3. the application of this study to the design of artificial limbs, org ans, and other prosthetic devices. — bionic, adj.
computerese	the jargon or language typical of those involved with computers.
cybernetics	the comparative study of complex electronic devices and the nervo us system in an attempt to understand better the nature of the huma n brain. — cyberneticist, n. — cybernetic, adj.
robotics	the application of automated machinery to tasks traditionally done by hand, as in manufacturing.
robotism	the use of automated machinery or manlike mechanical devices to perform tasks. — robotistic, adj. servomechanism
	a closedcircuit feedback system used in the automatic control of m achines, involving an error sensor using a small amount of energy, an amplifier, and a servom otor dispensing large amounts of power. Also called servo. — servomechanical, adj.

lautomation -

the act of implementing the control of equip ment with advanced technology; usually inv olving electronic hardware; "automation repl aces human workers by machines" mechanisation, mechanization computerization, cybernation the control of processes by computer high tech, high technology highly advanced technological development

(especially in electronics)

2.



automation -

the condition of being automatical ly operated or controlled: "automat ion increases productivity" condition, status -

a state at a particular time; "a con dition (or state) of disrepair"; "the current status of the arms negotiati ons"



automation -

equipment used to achieve automa tic control or operation; "this facto ry floor is a showcase for automati on and robotic equipment" equipment -

an instrumentality needed for an u ndertaking or to perform a service

automatic

3.

(o:ta'matik) adjective

1. (of a machine etc) working by itself. an automatic washingmachine.automatico

2. (of an action) without thinking. an automatic response.automatico noun

a self-loading gun. He has two automatics and a rifle.arma automatica automated (-mei-) adjective

working by automation. automatizado

auto matically adverb

This machine works automatically; He answered automatically automaticamente auto mation noun

(in factories etc) the use of machines, especially to work other

machines. Automation has resulted in people losing their jobs.automatizacion

automaton (o: tomoton) - plurals au tomata (-to), au tomatons - noun

a human-shaped machine that can be operated to move by itself, automata



A BPF specification (abbr.) Type of power supply Chemical symbol for silicon 1,+ 15 Down + 17 Across (second part of seasonal message tom RF Cafe)	1. Unit of inductance (abbr.) 2. Filter type with high rate of out-of-band attenuation (aka 'elliptic')
I. Type of power supply . Chemical symbol for silicon 1+ 15 Down + 17 Across (second part of seasonal message tom RF Cafe)	2. Filter type with high rate of out-of-band attenuation (aka 'elliptic')
Chemical symbol for silicon (1+ 15 Down + 17 Across (second part of seasonal message	
 + 15 Down + 17 Across (second part of seasonal message from RF Cafe) 	d fat' h
rom KF Cale)	3. Electric cororal discharge (pt.)
2 Heintentionally, share one the soulltakes Group and	4. 3-phase transformer configuration
2. Outlientonariy changes the oscillator frequency	 Semiconductor and calculator company (abbr.) Operating of a LO
6. The system than converts common website names to IP addresses	 Opposite of a LO Silicon transistor trans (abbr.)
abbr.)	8. Triangular joint filler added for strength
7. 11 Across + 15 Down + (second part of seasonal message	9. Insulating cover over a solder joint
rum RF Cafe)	10. Network department (abbr.)
8. Term for asymmetry of a statistical distribution	14. One port of an amplifier
0. Chemical symbol for argon	15.11 Across + +17 Across (second part of seasonal message
1. 1,000 seconds (abbr.)	from RF Cale)
 Modulation technique that varies the width of pulses in a train 	16. Type of current
abbr.)	17. A major search engine
5. Altin lo m EE, CE, AE, etc.	19. Fuses metals together using heat
.o. Amateur radio operator who is qualified to administer Amateur	22. Synchronous Digital Hierarchy
tadio licensing examinations (abov.)	23. Moon of Salum with retrograde orbit
 Prightspeck circuit-switched data (BB0); Allow of ison and low percentance of emban spectrum. 	29. A rectangular array of numbers in rows and columns that is
hromium etc.	25. Decree of IC contribution (where)
(1. Orthogenal frequency-division multiplexing (abbe.)	28. Commuter Assisted Device and Development
4. + 79 Across (first part of seasonal message from RF Cafe)	30 European Telecommunications Standards Institute (able)
6. Type of spread spectrum that does not use frequency honning	37. Facility where semiconductors are normifactured
abbr.)	33 5.280 feet (pl.)
8. Ticker symbol for Analog Devices	35. Type of flip-Bon
9. Broadband Signal Intrusion (abbr)	36. Weathermoof cover for a radar antenna (n).)
0. Lubricent	37. Below ELF
1. Chemical symbol for terbium	41 A statement that has been proven on the basis of previously
2. Chemical symbol for beryllium	established statements (pl.)
3. Chemical symbol for xenon	42. Number system of 1's and 0 s
5. Chamical symbol for francium	44. Computer messaging service (pl.)
7. Chemical symbol for helium	46. The "R" in R&D
8. Electromagnetic (abbr.)	47. Filter type that blocks lower frequencies (abbr.)
Nuclear explosion byproduct harmful to electronic (abbr., pl	49. Umi of length (abbr.)
2. Cell phone manufacturer	51. Unit of frequency (archaic, abbr.)
4. Miniature threaded RF connector (pl.)	53. Mass unit (abbr.)
 Amateur racio abbreviation for the Oceania region (abbr.) Chanting a mixed for leatherman 	55. Chemical symbol for silver
2. Deed between DC and DD	57. Une component of volume
 Dang oppygen Kr ang BB Electronics statuteruits fortunat with fortunated 15 land. 	59. LL D display vendor
 Chemical symbol for arbitrary 	61. 1001 numerical prenx
1 Chemical symbol for luterium	66. Theoremical
5 Electronics Industry Association table)	68. Time of matrix harvode used with least wanneutable.)
7. Sampling rate nioneer	69. Multihurctural alicon desizes (addr.)
0. Type of digital filter (abbr.)	71. Having to do with charged particles
2. Chemical symbol for mendelevium	75. Wideband CDMA
3. Amateur radio abbreviation for the Oceania region (abbr.)	77. First name of a British scientist of falling apple fame
4. Chemical symbol for selenium	80. Chemical symbol for rhodium
5. Weight (abbr.)	81. Galilean moon
6. Chemical symbol for bismuth	82 Test point (abbr.)
8. Unit of inductance (abbr.)	83 Unit of inductance (abbr.)
9. Across + (first part of seasonal message from RF Cafe)	84. Electronic enclosure
4. Chemical symbol for chlorine	 88. An angle described by hypotenuss/opposite sides of a right
5. Chemical symbol for holmtum	triangle
6. Unit of inductance (abbr.)	89. Unit of trequency (archaic, abbr.)
P. Unit of leasth (able)	91. Front edge of a wing (abor.)
Open or renger (400). Open or renger (400). Open or renger (400).	we acardie of the Arcel that helps hama solve technical problems
 Abditu to store a charao 	Q6 Repuise commuter dances interface (able)
A After Dramas	95. Formal state of Los Alamos Jab (ables)
7. Kind of tabe containing a constriction that is used to measure the	98. 1.602P-19 Joules
ate of flow of a fluid	99 Negation matix
01. FCC Part 15 rules annly in this band (abbr.)	100 Transformer interwinding connection
02. Voice of America	and the second states and the contestion
03. Chemical symbol for antimony	
04. Chemical symbol for neptunium	







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The textbook is intended for the development of speech skills in the English language among students studying in the specialty "Serving Technological Processes". The publication consists of four sections, each of which contains texts for study and introductory reading and tasks to check the reading (Comprehension); exercises to expand and consolidate active vocabulary general and professional plan (Vocabulary; Discussion); exercises based on professional vocabulary section tasks, aimed at developing students' written communication skills (Writing). The manual includes a glossary as well as additional reading texts.

Complies with the current requirements of the Federal State educational standard of secondary vocational education and professional requirements. For students studying in the specialty " Serving Technological Processes " and mastered the basic English course (level B1-B2 on the CEFR scale).



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