

**TOP
50**

ПРОФЕССИОНАЛЬНОЕ
ОБРАЗОВАНИЕ

Учебник



Е. А. Агеева



АНГЛИЙСКИЙ ЯЗЫК ДЛЯ СВАРЩИКОВ

ENGLISH FOR WELDERS

Е.А. АГЕЕВА

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ENGLISH FOR WELDERS

УЧЕБНИК

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Учебник рассчитан на уровень языковой подготовки Единого аттестационного экзамена А2. Он направлен на развитие навыков устной, письменной речи и чтения литературы по специальности на английском языке, овладение коммуникативными и профессиональными компетенциями. Задания приведены в формате ЕГЭ. В приложении предлагается учебный материал для подготовки к международному конкурсу WorldSkills.

Учебное издание предназначено для изучения общепрофессиональной дисциплины «Английский язык».

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УВАЖАЕМЫЙ ЧИТАТЕЛЬ!

Вы держите в руках учебник, который был подготовлен Издательским центром «Академия» в соответствии с Федеральным государственным образовательным стандартом (ФГОС) в рамках реализации комплексного проекта подготовки кадров по 50 наиболее востребованным на рынке труда, новым и перспективным профессиям и специальностям среднего профессионального образования.

Одной из задач проекта является обновление содержания профессионального образования с учетом профессиональных стандартов, современных методик и технологий. При разработке ФГОС также учитывались требования международных конкурсов профессионального мастерства, включая чемпионаты «Молодые профессионалы» (WorldSkills и WorldSkills Russia).

Издательский центр «Академия» является лидером по выпуску учебных материалов для СПО в Российской Федерации. Более двадцати лет наши издания помогают студентам овладевать знаниями, умениями и навыками по рабочим профессиям и специальностям. Стремясь идти в ногу со временем, издательство предлагает не только печатные издания, но и электронные учебники, электронные учебно-методические комплексы и виртуальные практикумы.

Интерактивная форма подачи информации с учетом последних методик и тенденций в преподавании — отличительная особенность и визитная карточка Издательского центра «Академия» на российском рынке.

Мы надеемся, что данный учебник будет полезен студентам, облегчит задачу преподавателей, а также поможет специалистам, которые стремятся расти и развиваться в выбранной ими области, достичь новых профессиональных вершин.

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ДОПОЛНИТЕЛЬНОЕ ЧТЕНИЕ
Приложение
Словарь терминов
Список литературы и интернет-источников

ПРЕДИСЛОВИЕ / PREFACE

Английский язык уже давно стал языком международного общения. Без него невозможно узнавать о последних открытиях во всех областях науки, изучать прогрессивные технологии и методы, обмениваться профессиональным опытом.

Предлагаемый учебник поможет вам в изучении английского языка применительно к профессии сварщика. Вы научитесь:

- правильно употреблять технические термины;
- читать и понимать инструкции к оборудованию;
- читать профессиональные журналы для сварщиков, быть в курсе современных тенденций в профессии;
- делиться опытом работы;
- принимать участие в международных профессиональных конкурсах;
- общаться с англоговорящими коллегами;
- работать за рубежом или в иностранной компании в России;
- понимать иностранных заказчиков;
- чувствовать себя уверенно.

Условные обозначения:

	— Настроимся		— Говорение
	— Словарь		— Тест
	— Чтение		— Домашнее задание
	— Словообразование		— Проектная работа

Автор выражает признательность:

- мужу Владимиру и дочери Марье за неоценимую помощь в работе над книгой;
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BASIC COURSE

Lesson 1. WELDING BASICS



Tuning in

1. Let's find out.

1. What English words related to your profession do you know?
2. Translate the title of the lesson: **weld** — сваривать металлы, **basics** — ...

A Vocabulary

2. Guess what these words and phrases mean.

Electrode — ? Metal — ? Profession — ? Welding machine — ?

3. Learn the new words.

alloy	(сущ.) сплав, пайка; (гл.) паять, припаивать
beam	(сущ.) луч; (гл.) светить, сиять
braze	(сущ.) сплав (металлов); (гл.) сплавлять
brazing	(сущ.) твердый припой
fuse	(сущ.) плавка, плавкий предохранитель; (гл.) плавить, сваривать
solder	(сущ.) припой, спайка; (гл.) спаивать, соединять
soldering	(сущ.) мягкий припой
(welding) torch	(сущ.) сварочная горелка

4. Look at the pictures and name the objects or processes in English.

1



2



3



4



5



- 5. Find the 6 new words in the word puzzle.
Read and translate them.**

t	o	r	c	h
b	r	a	z	e
c	f	u	s	e
a	l	l	o	y
m	w	c	l	d



Reading

- 6. Read and translate the sentences.**

1. Gold and iron alloy easily.
2. Fusing two pieces of metal together is a wonderful thing!
3. Be careful when working with a torch. The beam is bright.
4. Can you solder? — Yes, and very well. I like it.

- 7. Write 3 possible endings to complete the sentence.
Use the new words.**

Welding is impossible without...



Word Formation

- 8. Learn the meaning of the words in the spidergram
using the table.**

Prefix / suffix	Meaning
re-	еще раз, снова
un-	отрицательная приставка не-
-ing	указывает на род деятельности, занятие
-able	способный к чему-либо
-ability	способность к чему-либо
-er	указывает на действующее лицо
-ed	указывает на действие, совершенное в прошлом



9. Choose the correct variant.

- I am a *welder* / *welded*.
- I made a wrong weld. I should *weld* / *reweld*.
- Every *weldable* / *weldability* metal has its limits.
- I can't weld these metals. They are just *weldable* / *unweldable*.



Test

10. Complete the sentences with the suitable words from the spidergram.

1. ... is a man thing.
2. I will be a
3. I can
4. I made a weld but it got a defect. I have to ... it.
5. Yesterday I ... in the workshop.
6. Most of metals are
7. Some metals are
8. Aluminium has good



Homework

11. Write a short story about yourself using the prompts.

In the future, I am going to be

I can

To weld metals, I use

I can also

Lesson 2. WHAT IS WELDING?



Tuning in

1. Answer the questions.

1. What is your future profession?
2. Can you name any welding instruments?
3. What do you do when you work with metals?

A Vocabulary

2. Guess what these words mean.

Material — ? Process — ? Industry — ?

Note:

construction

(сущ.) сооружение, строительство, здание, конструкция

3. Learn the new words.

bond	(сущ.) связь; (гл.) связывать, скреплять
cool	(сущ.) охлаждение; (прил.) холодный; (гл.) охлаждать(ся), остывать
equipment	(сущ.) оборудование, техническое оснащение
join	(сущ.) связь, соединение, шов; (гл.) соединять, связывать

melt	(сущ.) расплавленное вещество, плавка; (гл.) плавить
molten	(прил.) расплавленный, жидкий
rank	(сущ.) ранг, категория, разряд, класс; (гл.) выстраивать в ряд, классифицировать

4. Find the 6 new words in the line. Read and translate them.

join melt cool equipment bond molten

5. Match the words in the columns to make phrases.

join	products
strong	metals
industrial	bond
metal	processes



Reading

6. Read and translate the text.

Welding is a process that joins materials, usually metals. The parts of the materials are melted, some molten material is added. When the molten material is cooled, it forms a strong bond.

Welding is the most practised way of joining metals together. Welding ranks high in industrial processes. In our everyday life, almost everything is made by welding or equipment made by welding. Welders can build metal products from coffeepots to skyscrapers.

7. Find in the text the English equivalents for the following Russian phrases.

- 1) процесс, который соединяет металлы
- 2) расплавленный металл
- 3) охлажденный металл
- 4) прочное соединение

8. Answer the questions in writing.

1. What is welding?
2. What is melted?
3. What is added?
4. What does welding form?
5. What can welders build?
6. Can you weld?

 **Word Formation**

9. Form the new words. Read and translate them.

Example: sky (небо) + scraper (скребок) = skyscraper (небоскреб)

- 1) under + water = ...
- 2) ship + yard = ...
- 3) air + port = ...

4) group + mate = ...

5) text + book = ...

6) coffee + pot = ...

10. Complete the sentences using the words from exercise 9.

1. I want some coffee. Where is the ... ?

2. Vnukovo is one of Moscow's

3. I wish I could see life

4. Life is so busy in

5. Ivan is my

6. This ... is useful for your studies.



Test

11. Complete the sentences using the correct forms of the words in capitals.

Example: Have you ever seen (0) underwater life?

WATER

Using the (1) ____ you can weld very well.

EQUIP

I can work as a (2) ____ .

WELD

When the molten metal is (3) ____ , it makes a strong bond.

COOL

You can see many ships in the (4) ____ .

SHIP

(5) ____ is very popular here.

WELD

12. Finish the sentences using the new words.

1. A person who sits next to you in the classroom is your
2. At high temperatures, some metals become
3. An added molten metal forms a strong
4. A welding machine, a torch and electrodes are your
5. Joining two pieces of metal together means



Homework

13. Fill in the table using the given words.

braze, electrode, fuse, gold, iron, melt, metal, solder, torch, weld, welder, welding machine

Equipment	Activity	Material	Profession

Lesson 3. WHERE CAN WELDERS WORK?

WiFi Tuning in

1. Let's revise.

1. What is welding?
2. What can welders weld?
3. What do welders use in their work?
4. What do welders do with metals?

A Vocabulary

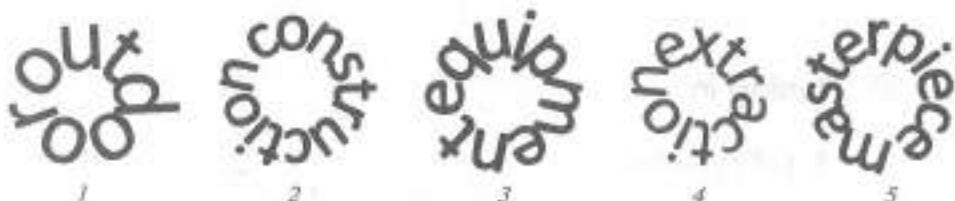
2. Guess what these words mean.

Art — ? Automobile — ? Company — ? Electric — ? Electronic — ? Gas — ?
Sculptor — ? Service — ?

3. Learn the new words.

extraction	(сущ.) извлечение, добыча
mining	(сущ.) горное дело, разработка (полезных ископаемых), добыча (полезных ископаемых)
oil	(сущ.) нефть, смазочный материал; (гл.) смазывать
plant	(сущ.) предприятие, завод
repair	(сущ.) ремонт; (гл.) ремонтировать, чинить
space	(сущ.) пространство, расстояние, космос

4. Find the first letter in the words. Read and translate them.



5. Match the words in the columns to make phrases.

repairing	equipment
oil	industry
welding	extraction
space	service



Reading

6. Read and translate the text.

Welding can be done indoors, outdoors, underwater and in space.

As a welder, you can work in the ship, automobile and plane building industry, houses and bridges construction, the space industry, repairing services.

Mining, oil and gas extraction industries form another group of welders. Welders work in the electrical and electronic equipment companies.

Some sculptors also need skills in welding. In art, you can see masterpieces of welders' work.

The St Louis Arch, made of steel, is one of the best known.



The St. Louis Arch

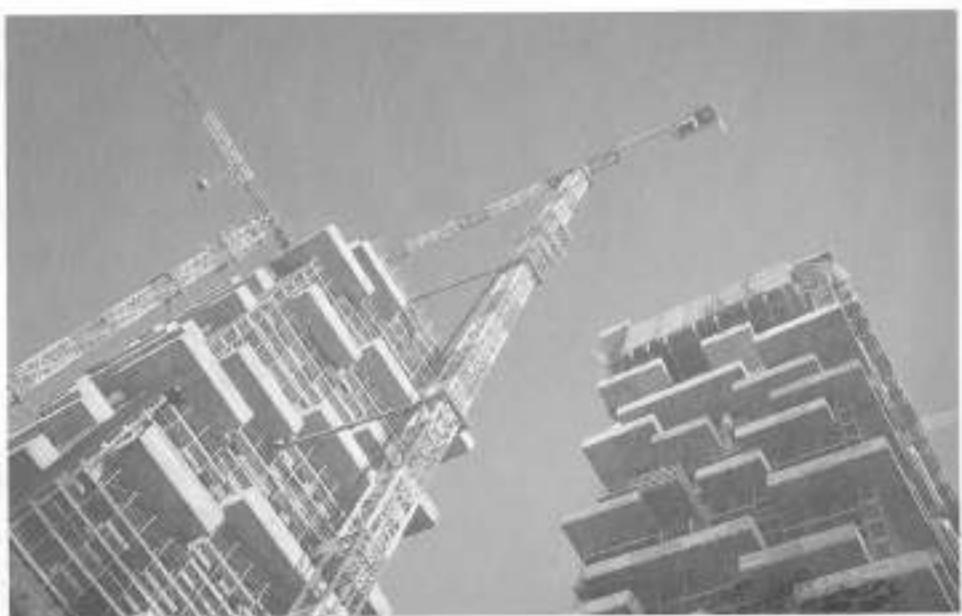
7. Find in the text the English equivalents for the following Russian phrases.

- 1) компания по производству электрооборудования
- 2) судостроительная индустрия
- 3) автомобилестроительная индустрия
- 4) авиастроительная индустрия
- 5) добыча природных ископаемых
- 6) добыча нефти и газа
- 7) шедевры работ в искусстве

8. Look at the pictures and name the spheres where welders can work.

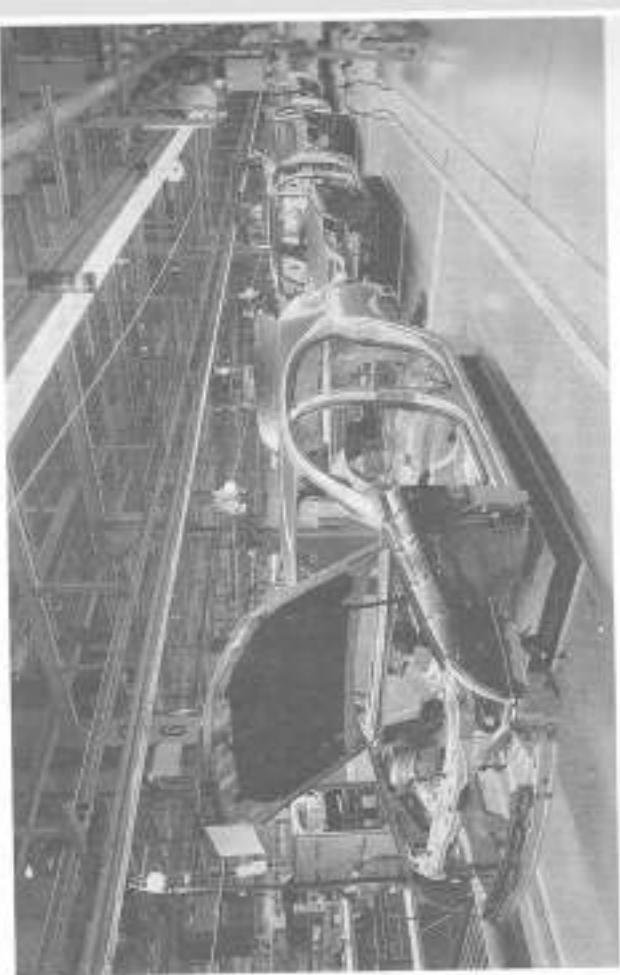


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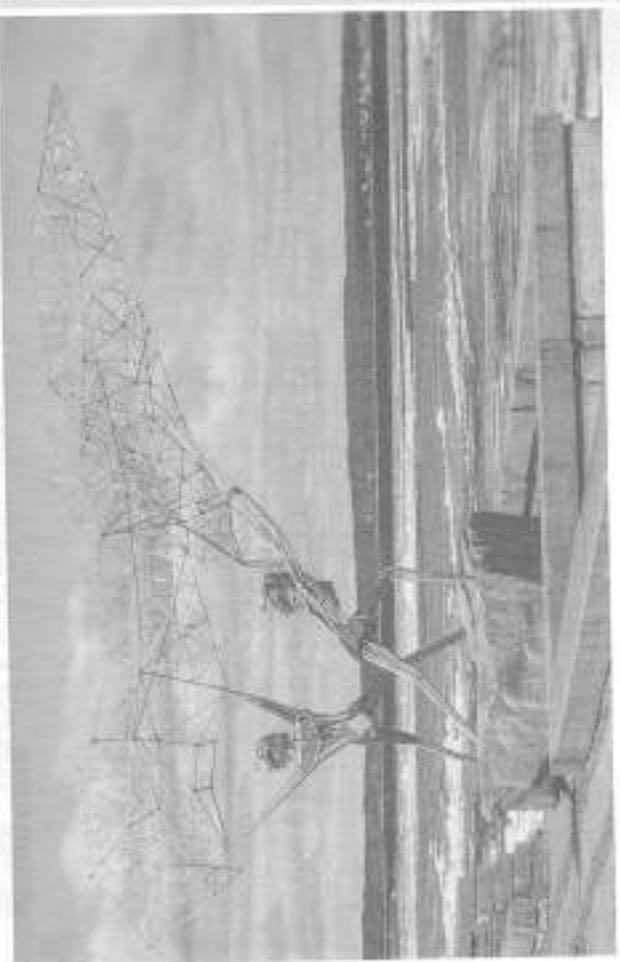


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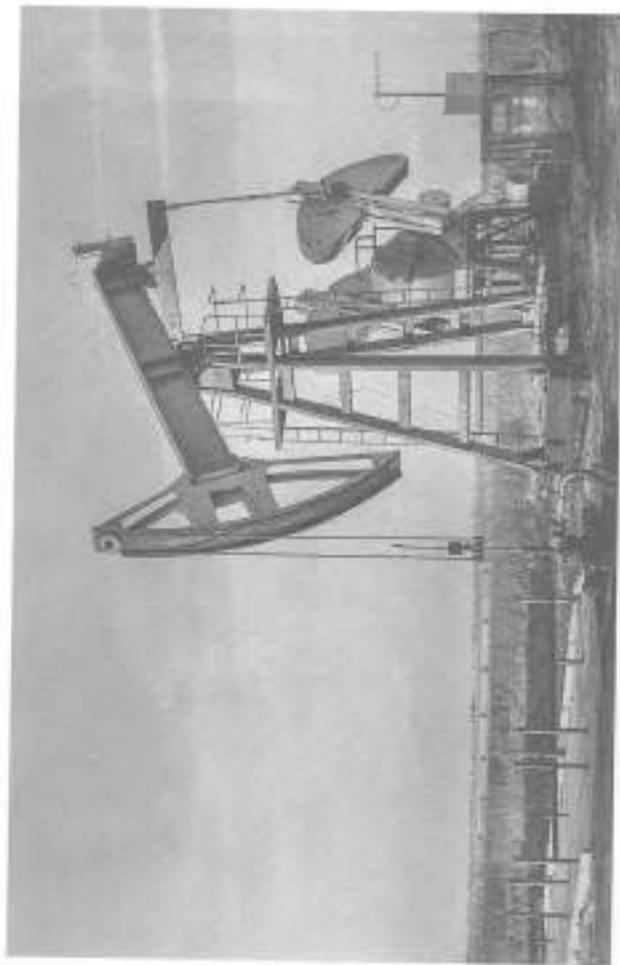




7



8



9



6



Speaking

9. Answer the questions.

1. Where would you like to work?
2. What sphere is the most interesting for you? Why?

10. Read and complete the dialogue.

A Talk at the WorldSkills Competition

- Hello! I am Alexander.
- Hi! I am Mark. I am from Germany. Where are you from?
- I am from Russia. I am a welder.
- I am a welder too. Where are you going to work after finishing your college?
- Maybe I will work at a shipbuilding plant. I love ships. What about you?
- I am interested in cars.
- Let me guess. You will work for the largest ... company of Germany.
- Yes, exactly.

11. In pairs, make up your own dialogue. Act it out.



Test

12. Complete the sentences using the given words.

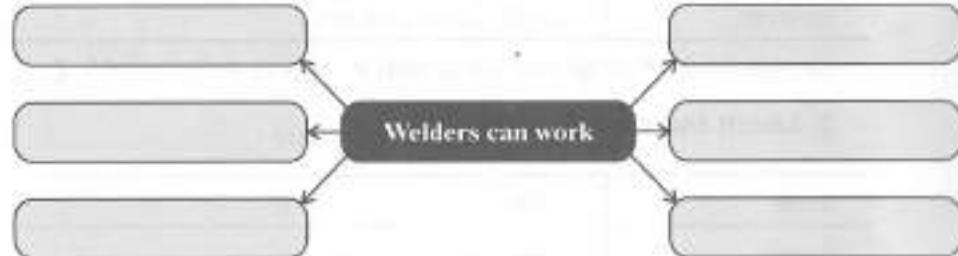
underwater, art, service, automobile, construction, space, extraction, shipyards, equipment

1. As a welder, you can find a job in bridge and house ... and repairing
2. Welders work in the electrical and electronic ... companies.
3. Mining, oil and gas ... industries form another group of welders.
4. Welders can use their skills in ... , making sculptures.
5. Repairing ships, welding can be made ... or at the
6. Russian cosmonauts made the first welding in
7. To make or repair cars, welders work in the ... industry.



Homework

13. Fill in the spidergram.



Lesson 4. METALS



Tuning in

1. Answer the questions.

1. Where can welders work?
2. What sphere of work would you choose? Why?
3. What metals do you know?
4. What countries can you name in English?

A Vocabulary

2. Guess what these words and phrases mean.

Aluminium — ? Bronze — ? Exporter — ? Mineral resources — ? Nickel — ?
Reserve — ? Uranium — ? Zinc — ?

Note!

mixture	(сущ.) смесь, состав
---------	----------------------

3. Learn the new words.

brass	(сущ.) латунь
copper	(сущ.) медь
gold	(сущ.) золото
iron	(сущ.) железо
lead	(сущ.) свинец

ore	(сущ.) руда
possess	(гл.) обладать, владеть
precious	(прил.) драгоценный (металл, камень)
silver	(сущ.) серебро
steel	(сущ.) сталь
tin	(сущ.) жесть

4. Find the 8 new words in the word puzzle.

t	i	r	o	n	s	b
i	z	i	n	c	i	r
n	f	k	g	o	l	d
l	e	a	d	r	v	e
m	v	s	t	e	e	l
c	o	p	p	e	r	b

5. Match the words in the columns to make phrases.

iron	metals
precious	ore
mineral	reserves
possess	resources



Reading

6. Read and translate the text.

Mineral reserves are very important for the economy of the countries possessing these minerals.

Many wars and colonizations happened because of precious metals.

Australia is the continent which has world's biggest reserves of uranium.

Canada is the largest exporter of uranium ore. Mexico is the largest silver exporter in the world.

One of the most common elements found on earth is iron. The five largest producers of iron ore are China, Brazil, Australia, Russia and India. These five countries have about 70 per cent of the world's iron ore production.

Canada, the United States and Western Australia are also major mining countries for gold. The world's oceans have big reserves of gold.

Copper ore is found in Chile, Mexico, the United States, Indonesia, Australia, Peru, Russia, Canada, China, Poland and Kazakhstan.

7. Choose True or False for each sentence.

Correct the false sentences.

	True	False
1. Minerals are important for countries.		
2. Australia and Canada have a large amount of uranium.		
3. It is difficult to find iron on Earth.		
4. Gold and silver are precious metals.		
5. No wars happened because of mineral resources.		
6. Mexico is the largest exporter of gold.		
7. The world's oceans have small reserves of gold.		
8. Copper is found in many countries.		

8. Look at the map of Russia and answer the questions.

1. What mineral resources does Russia have?
2. What regions are rich in mineral recourses?
3. What precious metals does Russia possess?
4. Are there any mineral resources in the region where you live?
5. What metal do you usually work with?
6. What metal would you like to work with?



● — Ferrous; ● — Copper; ♦ — Aluminium; ◇ — Other non-ferrous

9. Read and complete the dialogue.

- Hello. What are you doing?
- I am soldering.
- What material are you using?
- Guess. I am using a mixture of copper and zinc.
- Let me think. Is it ... ?
- Yes, you are right.

10. In pairs, make up your own dialogue. Act it out.



Test

11. Complete the sentences using the given words.

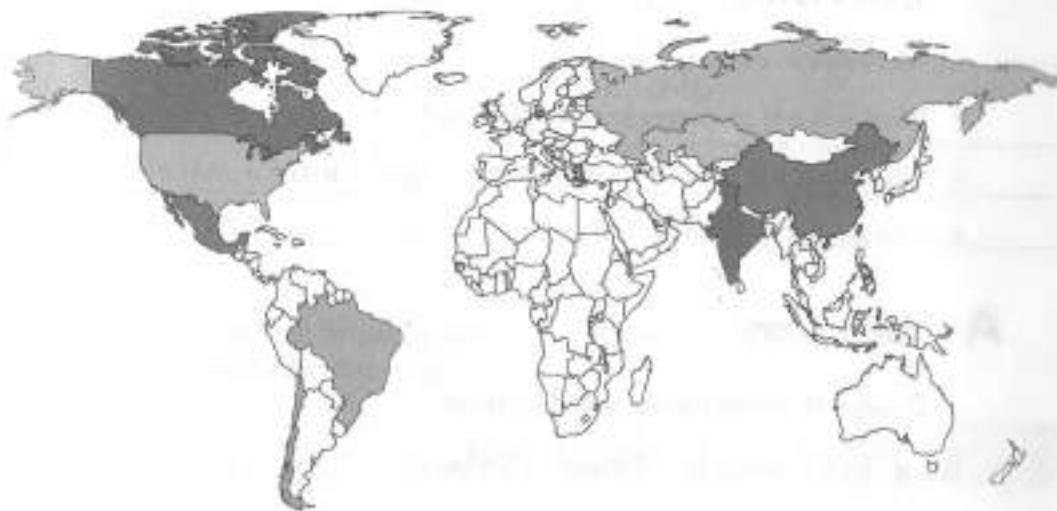
precious, ore, common, reserves, mining, exporter

1. Australia is a continent with the world's largest uranium
2. Canada is the largest exporter of uranium
3. Mexico is the largest silver ... in the world.
4. One of the most ... elements found on Earth is iron.
5. Canada, the United States and Western Australia are also major ... locations for gold.
6. Gold and silver are ... metals.



Homework

12. Look at the map of the world and mark the countries and their natural resources using the information from the text.



Lesson 5. PROPERTIES OF METALS



Tuning in

1. Let's revise.

1. What metals can you name?
2. What mineral resources is Russia rich in?
3. What have you learned about mineral resources in the world?
4. Can you show them on the map?

A Vocabulary

2. Guess what these words mean.

Barrier — ? Corrosion — ? Form — ? Superior — ? Salt — ?

3. Learn the new words.

advantage	(сущ.) преимущество, превосходство
coating	(сущ.) покрытие
compatible	(прил.) совместимый, сходный
dent	(сущ.) вмятина, выбойна
drawback	(сущ.) недостаток, изъян, помеха
expansion	(сущ.) расширение, растяжение, увеличение (в объеме), пространство, экспансия
longevity	(сущ.) долголетие
patina	(сущ.) патина; пленка или налет, возникающие в результате окисления или других химических процессов

prone	(прил.) склонный, предрасположенный (к чему-либо)
provide	(гл.) обеспечивать
resistant	(прил.) стойкий, прочный, обладающий способностью к сопротивлению
rust	(сущ.) ржавчина, коррозия; (гл.) ржаветь, подвергаться коррозии
scratch	(сущ.) царапина, скрип; (гл.) царапать, скрипеть
treated	(прил.) обработанный
wear away	(гл.) стираться, стирать

4. Fill in the missing letters in the words.
Read and translate them.

Example: rst — rust

- 1) ptn
- 2) prvd
- 3) scrtch
- 4) dnt-rsstnt
- 5) drwbck
- 6) cmptbl

5. Complete the words and phrases using the new words.

- 1) ...-resistant
- 2) dent-...

3) drawbacks of the ...

4) prone to ...

5) provide ...



Reading

6. Read the table and do the exercises below.

Materials	Advantages	Drawbacks	Incompatible materials	Longevity
Galvanized steel*	Least expensive, strong and dent-resistant. Zinc coating heals small cuts and scratches	Rust after zinc coating wears away	Brass, bronze, untreated iron	Unpainted 15 to 30 years. Exposed to salt spray from 5 to 10 years
Aluminized steel**	Provides a good barrier to corrosion	Prone to corrosion	Brass, bronze, lead, copper	Unpainted 20 to 40 years
Aluminium	Superior corrosion resistance. Light weight. Good for using in coastal areas	Relatively soft. Low melting point	Lead, copper	Unpainted 30 to 50 years
Copper	Easily formed. Superior corrosion resistance. Green patina	Very expensive	Aluminium, brass, bronze, zinc	60+ years
Zinc	Easily formed. Superior corrosion resistance. Bluish-white patina	Expensive	Brass, bronze, copper	60+ years

* Оцинкованная сталь.

** Алюминированная сталь.

7. Answer the questions.

1. What are the advantages and disadvantages of galvanized steel?
2. What metals is it incompatible with?
3. Does galvanized steel have a long life?
4. Does aluminized steel differ from galvanized one? How?
5. What are the advantages and disadvantages in using aluminium? What is its longevity?
6. What is special about copper?
7. What can you say about zinc?
8. Can you name the common properties of different metals?
9. What metals from the table in exercise 6 have you worked with? Was it easy or difficult for you?
10. What metal would you like to work with? Why?



Speaking

8. Read the dialogue. What metal would you use in this situation? Why?

A Talk at the Workshop

- What are you doing?
- I am going to make a weld. My sister's aquarium needs repairing.
- What metal?
- Aluminium. It is cheap and light.
- Besides, it is resistant to corrosion. Will you paint it?
- No, I won't. I like the colour of the patina. It's silver-white.

- A good choice.
- Agree.

9. In pairs, make up your own dialogue. Act it out.

Word Formation

10. The prefixes *un-*, *in-*, *dis-* mean *не-*. Form the new words. Read and translate them.

Example: *un* (*не*) + **treated** (обработанный) = **untreated** (необработанный)

- 1) *un* + **painted** = ...
- 2) *un* + **fortunate** = ...
- 3) *in* + **compatible** = ...
- 4) *in* + **valid** = ...
- 5) *in* + **expensive** = ...
- 6) *dis* + **advantage** = ...
- 7) *dis* + **like** = ...

11. Complete the sentences using the words from exercise 10.

1. Sorry, your passport is
2. What is the drawback of the metal? — The ... is its longevity. It is too short.
3. The price is good. This material is
4. I am late everywhere today. It is an ... day for me. I ... being late.
5. ... bronze looks nice.



Test

12. Complete the text using the correct forms of the words in capitals.

Example: Steel is (0) inexpensive.

EXPENSIVE

Aluminized steel makes a good barrier to (1) ____.

CORRODE

Aluminium has good rust (2) ____.

RESIST

Copper is (3) ____ with aluminium, brass and bronze.

COMPARE

Zinc is (4) ____ corrosion resistant.

SUPER

Zinc has (5) ____-white patina.

BLUE

The (6) ____ of copper is great.

LONG

(7) ____ steel can be used up to 30 years.

PAINT



Homework



13. Make a leaflet for any metal which wasn't discussed in the lesson. Write about:

- its advantages,
- its drawbacks,
- metals incompatible with it,
- its longevity,
- places where it is found,
- its application (where it is used).

Lesson 6. MECHANICAL AND CHEMICAL PROPERTIES OF CARBON STEEL



Tuning in

1. Let's revise.

1. What metals can you name?
2. Can you tell us new information about properties of the metal you chose for your project?
3. What is an alloy?
4. What alloys have you worked with?

A Vocabulary

2. Guess what these words mean.

Chemical — ? Chromium — ? Deformation — ? Element — ? Non-industrial — ?
Per cent — ? Physical — ? Ultra — ?

3. Learn the new words and phrases.

add	(гл.) добавлять
axle	(сущ.) вал, ось, шпиндель
body panels	панели кузова
brittle	(прил.) хрупкий, ломкий
carbon	(сущ.) углерод
contain	(гл.) содержать, включать, иметь

cut	(сущ.) разрез, порез; (гл.) резать
ductility	(сущ.) способность принимать нужную форму; пластичность
forging	(сущ.) ковка, сплавление
heat	(сущ.) нагревание; (гл.) нагревать
machinability	(сущ.) обрабатываемость
malleability	(сущ.) способность металла изменять форму под действием пресса; ковкость
manganese	(сущ.) марганец
mild	(прил.) мягкий, умеренный
plain	(прил.) простой, ясный, очевидный
poor	(прил.) плохой
punch	(сущ.) компостер
spring	(сущ.) пружина
wear resistance	износостойкость
wire	(сущ.) провод, кабель, проводник, проволока

4. Find the first letter in the words. Read and translate them.

1

2

3

4

5

5. Match the opposites.

mild	high
low	hard
brittle	cold
heat	poor
excellent	strong



Reading

6. Read and translate the text.

Steel is an alloy. It is made from iron and carbon. Other chemical elements can be used as well. If the main alloying element is carbon, the steel is called carbon steel or plain carbon steel.

Low-carbon steel and mild steel (низкоуглеродистая и малоуглеродистая сталь). Low-carbon steel typically contains 0.05 to 0.15 per cent carbon. Mild steel contains 0.16 to 0.29 per cent. Such steels are not brittle, but not ductile (easily stretched) either. They are less hard but more malleable (easily deformed under compressive stress) than higher carbon steels. Their malleability and lower price make them useful in construction. Their machinability and weldability are good as well. The alloys are also used for wires and automobile body panels.

Medium-carbon steels (среднеуглеродистые стали). Medium-carbon steels contain 0.30 to 0.59 per cent carbon. They can also contain 0.60 to 1.65 per cent manganese. Medium-carbon steels are more ductile than high-carbon steels, and harder and less malleable than low-carbon steels. Medium-carbon steels have good wear resistance, that is why they are often used for automobile parts and similar applications. The alloys are also used in forging.

High-carbon steels (высокоуглеродистые стали). High-carbon steels contain around 0.6 to 0.99 per cent carbon. They may also contain up to 0.90 per cent manganese. They are very hard and strong, but less ductile and malleable than medium- and low-carbon steels. They become harder after heating. They

have excellent wear resistance. The alloys are strong and resistant to deformation under compression, that's why they are used to make springs and high-strength wires.

Ultrahigh-carbon steels (сверхвысокоуглеродистые стали). Ultrahigh-carbon steels can contain between 1.25 and 2.0 per cent carbon. They can become extremely hard. They can be given a very sharp edge. It makes them good cutting tools. The alloys are used to make punches and axles. The addition of more than 10 per cent chromium produces stainless steel.

7. Choose the correct variant.

1. Steel is *an alloy / a mineral element*.
2. Low-carbon steel is *less malleable / more malleable* than higher-carbon steels.
3. Medium-carbon steels have good *wear / water* resistance.
4. High-carbon steels respond well to *cold / heat* treatment, becoming *harder / milder*.
5. High-carbon steels have *excellent / poor* wear resistance.
6. Ultrahigh-carbon steels can become *hardly / extremely* hard.

8. Answer the questions.

1. What alloy of steel have you worked with?
2. Was it easy or difficult? Why?
3. What properties of steel make welding easy?
4. What drawbacks does steel have?



Word Formation

9. Name the words used to form the given words.

Example:

weldability (свариваемость) = weld (сварка) + ability (способность)

- 1) machinability = ... + ...
- 2) malleability = ... + ...
- 3) formability = ... + ...
- 4) ductility = ... + ...

10. Find in the text the sentences with the words from exercise 9. Read them out.



Test

11. Odd one out.

Example: carbon, manganese, chromium, water

- 1) brittle, strong, hard, mild, cut
- 2) weldability, construction, machinability, ductility, wear resistance
- 3) car body panels, spring, wire, heat, cutting tool
- 4) axle, add, cut, heat, use, deform
- 5) excellent, well, poor, good, punch

12. Complete the sentences using the correct forms of the words in capitals.

Example: Some alloys are prone to (0) deformation.

DEFORM

Low-carbon steels (1) ____ make them useful
in construction.

MALLEABLE

(2) ____ of low-carbon steel is good.

WELD

Medium-carbon steels are also used in (3) ____ and
for large parts.

FORGE

High-carbon steels are strong and resistant
to deformation under (4) ____ .

COMPRESS

The (5) ____ of more than 10 per cent chromium
produces stainless steel.

ADD



Homework

13. Fill in the table using the information from the text.

Alloys of steel	Percentage of carbon	Properties	Application
1.			
2.			
3.			
4.			

Lesson 7. MECHANICAL AND CHEMICAL PROPERTIES OF STAINLESS STEEL



Tuning in

1. Let's revise.

1. What do you remember about the properties of carbon steel?
2. How many types of carbon steel can you name?
3. What are their applications? Use the table you made at home.

A Vocabulary

2. Guess what these words mean.

Aerospace — ? Element — ? Ferromagnetic — ? Instrument — ? Metallurgy — ?
Minimum — ? Molybdenum — ?

Note!

composition	(сущ.) состав, композиция, структура
decoration	(сущ.) украшение
silicone	(сущ.) кремний

3. Learn the new words and phrases.

austenitic	(прил.) austenитный
coil	(сущ.) змеевик, аппарат для теплообмена
cutlery	(сущ.) столовые приборы
definition	(сущ.) определение
ferritic	(прил.) ферритный

household hardware	предметы домашнего обихода (замки, ключи, дверные ручки и т.д.)
invent	(гл.) изобретать, создавать, выдумывать
martensitic	(прил.) мартеновский
nitrogen	(сущ.) азот
nuclear	(прил.) ядерный, атомный
parlance	(сущ.) манера речи, манера выражаться
precipitation hardening	дисперсионное твердение
prevent	(гл.) предотвращать, предупреждать
stain	(сущ.) пятно; (гл.) портить, пачкать
surgical	(прил.) хирургический, операционный
utensils	(сущ.) утварь, посуда

4. Find the 5 new words in the line.

cutlery ferritic martensitic austenitic oil

5. Complete the phrases using the new words.

- 1) precipitation ...
- 2) ... a new alloy
- 3) ... instruments
- 4) engineering ...
- 5) household ...



Reading

6. Read the text and match the headings to the sections.

- A. Types of Stainless Steel
- B. History
- C. Definition
- D. Chemical Properties
- E. Application

1. Stainless steel is an alloy of iron and chromium. Chromium makes it stainless. In metallurgy, stainless steel is known as SS in the engineering parlance. This is a steel alloy with a minimum of 10.5% chromium content by mass. It is highly resistant to corrosion, rusting and staining, that's why the name of it is 'stainless' steel.
2. Pure iron (Fe) mixed with carbon is the main element of stainless steel. Chromium, added to steel, makes it resistant to rust. Chromium forms a layer of chromium oxide. It prevents mechanical and chemical damages. The other contents of steel are nickel, nitrogen, silicone, molybdenum and aluminium. Small contents of nickel increase the corrosion resistance.
3. There are five major types of stainless steel such as ferritic, martensitic, precipitation hardening, austenitic and duplex (ferrite-austenitic). Ferritic stainless steel contains about 30% of chromium. It has good formability and ductility. Martensitic stainless steel is a mixture of about 18% of chromium and about 1% of carbon. It can be hardened by heating. It is less corrosion resistant. Precipitation hardened SS is extremely strong after heat treatment. It has a composition of 17% chromium, 4% nickel and 4% copper. Austenitic steel possesses a minimum of 16% chromium and 6% nickel. It becomes brittle at low temperatures. Duplex steel is characterized by high chromium (19–32%) and molybdenum (up to 5%) content. It is extremely corrosion resistant and has good weldability.
4. Stainless steel is a widely used material in industrial and non-industrial application. Ferritic stainless steel is excellent for making cooking utensils and is used in transport. Martensitic stainless steel is used for surgical instruments, scalpels, razor blades and knives. Precipitation hardened SS is applied in the oil and gas, nuclear and aerospace industries, and in shipbuilding. Austenitic

steel is applied for producing household hardware, coils, doors and windows. Decorations made of stainless steel are very popular.

5. This material was invented in 1912 by Harry Brearley in Sheffield, England. He was a metallurgist. Brearley was experimenting with different types of steel for weapons and noticed that 13% chromium steel had not corroded after several months. The material that Brearley invented was a martensitic steel alloy. It was industrialized later. The first non-industrial application of this material was in cutlery, for which Sheffield became famous all over the world.

7. Make sentences using the given words.

1. chromium steel stainless an alloy is of and iron
2. highly corrosion it resistant is
3. widely stainless used steel is material a

8. Answer the questions.

1. What does the abbreviation SS stand for?
2. What is SS made of?
3. What makes steel stainless?
4. Who invented SS?
5. What is Sheffield famous for?
6. Where is SS used?
7. How many types of stainless steel do you know?
8. Do you have any stainless steel items at home?



Word Formation

9. The suffix **-less** means **без-**. Form the new words. Read and translate them.

Example: care (забота) + less = careless (беззаботный)

- 1) money + less = ...
- 2) hope + less = ...
- 3) wire + less = ...
- 4) use + less = ...
- 5) weld + less = ...

10. Make sentences about yourself using the words from exercise 9 and the prompts.

Sometimes I am

I feel

I can be

I like using



Test

11. Complete the sentences using the given words.

chromium, cutlery, invented, nuclear, parlance, rust, SS, stainless, types

1. Stainless steel is an alloy of iron and
2. Chromium makes the alloy

3. Chromium, added to steel, makes it resistant to
4. In engineering ... , stainless steel is known as
5. There are five major ... of stainless steel.
6. The alloy was ... in 1912 by Harry Brearley.
7. Stainless steel is used in the ... industry and in



Homework

12. Fill in the table with the information from the text.

Types of stainless steel	Properties	Application
1.		
2.		
3.		
4.		
5.		

Lesson 8. MECHANICAL AND CHEMICAL PROPERTIES OF ALUMINIUM



Tuning in

1. Answer the questions.

1. What is a composition of stainless steel?
2. What properties of stainless steel can you name?
3. What are the most important properties of SS?
4. Where is stainless steel used?

A Vocabulary

2. Guess what these words and phrases mean.

Atomic number — ? Chemical symbol — ? Isotope mass — ? Magnetic fields — ?
Neutral — ? Oxide — ? Thermal — ?

Note!

conductor	(сущ.) провод, проводник
machining	(сущ.) обработка

3. Learn the new words and phrases.

acid environment	кислая среда
avoid	(гл.) избегать, сторониться
bend	(сущ.) сгиб, поворот; (гл.) сгибать, гнуть
conductivity	(сущ.) проводимость, электропроводность, теплопроводность, проницаемость

damage	(сущ.) вред, повреждение, порча, убыток; (гл.) повреждать, портить, вредить
decrease	(сущ.) убывание, понижение, спад; (гл.) уменьшать, убавлять, сокращать
durable	(прил.) долговечный, надежный, крепкий
exploit	(гл.) использовать, эксплуатировать, разрабатывать (месторождения)
foil	(сущ.) фольга
increase	(сущ.) увеличение, возрастание, прибавление; (гл.) увеличивать, повышать, усиливать
layer	(сущ.) слой, пласт
oxygen	(сущ.) кислород
recycle	(сущ.) процесс вторичной переработки; (гл.) повторно использовать, возвращать в оборот, перерабатывать
weight	(сущ.) груз; вес, масса
wide	(прил.) широкий

4. Find the 10 new words in the word puzzle.

d	e	c	т	е	а	s	e
g	x	y	е	т	t	l	d
s	p	a	с	f	o	a	u
a	l	c	у	o	m	y	r
v	o	i	c	i	i	е	a
o	i	d	l	l	c	т	b
i	t	h	е	г	a	l	l
d	a	m	a	g	e	m	e



Reading

5. Read and translate the text.

Aluminium

General information. There are two variants of the name of this metal. The British variant is aluminium and the American variant is aluminum.

After iron, aluminium is now the second most widely used metal in the world. Aluminium is a 'clean' material. It looks good without finishing. Aluminium is also very easy to recycle.

Chemical properties. Aluminium has a chemical symbol Al, atomic number 13 and atomic weight 26.98. The isotope has mass number 27. It is a soft, light, silvery-white metal.

Physical properties. The properties of aluminium include low density and low weight, high strength, superior malleability, easy machining and excellent corrosion resistance. It has good thermal and electrical conductivity.

Its melting point is 660 °C and boiling point is 2,400 °C.

Strength. Aluminium does not become brittle at low temperatures. Instead, its strength increases. At high temperatures, aluminium's strength decreases.

Machining. Machining methods, such as drilling, cutting, punching and bending, work with aluminium easily. The energy input during the process is low.

Formability. Aluminium's superior formability is important. This property is exploited in the rolling of foils, as well as in bending and other forming operations.

Conductivity. Aluminium is an excellent conductor of heat and electricity.

Joining. Aluminium is easily welded. Aluminium is impossible to braze. It is a big disadvantage of the metal.

Corrosion resistance. Aluminium reacts with the oxygen in the air to form an extremely thin layer of oxide. Though it is only one-thousandth of a millimetre thick, the layer is dense and provides excellent corrosion protection. The layer is self-repairing if it is damaged. Aluminium is extremely durable in neutral and slightly acid environments.

Non-magnetic material. Aluminium is a non-magnetic material. To avoid interference of magnetic fields, aluminium is often used in magnet X-ray devices.

Uses of aluminium. The principal uses of aluminium are for aircraft, machinery, electrical conductors and cooking utensils. Aluminium is used for making small containers. Aluminium cans are popular, especially for soft drinks. Aluminium foil has replaced tinfoil in the kitchen and in packaging products. It is much cheaper. It resists chemical attacks, and it is safe for food while it has a layer of oxide. Because of its corrosion resistance, aluminium is used for window framing. Radiators are made from aluminium, because its thermal conductivity is great.

6. Match the item made of aluminium with the property important for this particular item. In some cases, two properties are possible.

foil	thermal conductivity
kitchen utensils	corrosion resistance
cans and containers	light weight
airplane	chemical attacks resistance
radiator	non-magnetic
window frame	formability
X-ray device	strength

**7. Choose True or False for each sentence.
Correct the false sentences.**

	True	False
1. Aluminium is now the first most widely used metal in the world.		
2. It is possible to braze aluminium.		
3. Aluminium isn't brittle at low temperatures.		

Continued on p. 56

	True	False
4. Aluminium is a poor conductor of heat and electricity.		
5. The energy input during machining of aluminium is high.		
6. Aluminium has a thin layer of oxide, which protects it from damages.		
7. Aluminium is magnetic.		
8. Aluminium is easily recycled.		
9. Aluminium has poor formability.		

Word Formation

8. The prefix **de-** has a negative meaning. Form the new words. Read and translate them.

Example: de + form (принимать форму, образовывать) = deform (деформировать, искажать)

- 1) de + nationalize = ...
- 2) de + throne = ...
- 3) de + centralize = ...
- 4) de + stabilize = ...

9. What spheres of life are these words used in (politics / art / industry / army)?



Test

10. Complete the sentences using the correct forms of the words in capitals.

After iron, aluminium is now the (1) ___ most
(2) ___ used metal in the world.

TWO
WIDE

The properties of aluminium are high strength, superior
(3) ___ and easy (4) ___ .

MALLEABLE
MACHINE

Aluminium is an excellent (5) ___ of heat and electricity.

CONDUCT

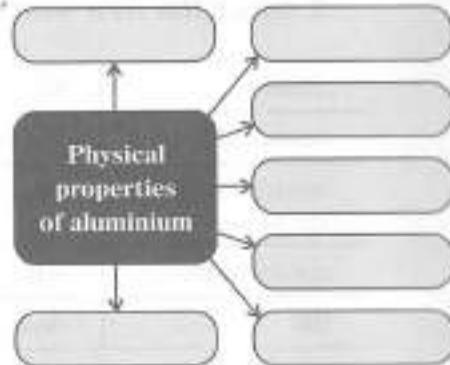
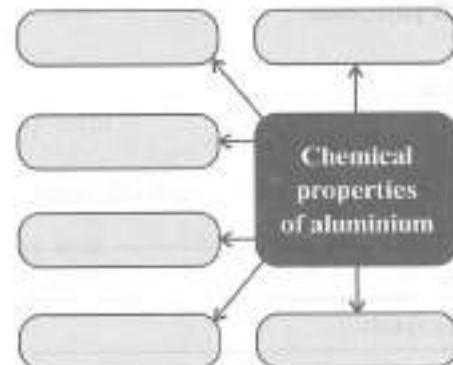
11. Complete the words in the sentences. The first letter or two letters are given.

1. After iron, a ___ is now the s ___ most widely used m ___ in the world.
2. Aluminium is a 'c ___' material.
3. Aluminium is also very easy to r ___.
4. The properties of aluminium include low d ___ and low w ___ , excellent e ___ resistance and good th ___ and electrical c ___.
5. The en ___ input during machining is l ___.



Homework

12. Complete the spidergram using the text.



Lesson 9. EQUIPMENT IN WELDING

Wifi Tuning in

1. Let's revise.

1. What properties does aluminium have?
2. Where is it used?
3. Do you like to work with aluminium? Why?
4. What do you need to make a weld?
5. What welding equipment can you use?

A Vocabulary

2. Guess what these words mean.

Accident — ? Comfort — ? Marker — ? Optimal — ? Respirator — ?
Sensor — ?

3. Learn the new words and phrases.

chisel	(сущ.) зубило
consumables	(сущ.) расходные материалы
cutting torch / cut torch	сварочная горелка для резки металла, резак
ear defenders	наушники
file	(сущ.) напильник
framing square	столярный угольник

goggles	(сущ.) защитные очки
grinding machine	шлифовальный станок, болгарка
measuring tape	измерительная лента
overall	(сущ.) комбинезон, спецодежда
protective face shield	защитный щиток для лица
scraper	(сущ.) скребок
slag hammer	молоток для очищения от шлака
steel-toed boots	ботинки со стальным носком
steel wire brush	щетка из стальной проволоки
universal welding gauges	универсальный шаблон сварщика (УШС)
welding gloves	перчатки, краги для сварки
welding helmet	шлем сварщика

4. Fill in the missing letters in the words.
Read and translate them.

- 1) gggl^s
- 2) glvs
- 3) scrpr
- 4) hmmr
- 5) chsl
- 6) cnsmbls

5. Match the words in the columns to make a phrase.

wire	shield
face	tape
ear	brush
measuring	defenders
protective	square
framing	machine
grinding	boots



Reading

6. Read and translate the advertisements of some welding equipment. What is being advertised?

1.

**CLASSIC WELDING VARIABLE-SHADE (shades 8—13)
auto darkening model**

with a flip-up panel on the front that exposes
180 degrees of clear vision.

It has three independent sensors
for optimal response time.

Our model will protect your head.

YOU WILL FEEL COMFORTABLE IN IT.

2.

**TO ANYONE WHO THINKS EYE PROTECTION
CAN BE NOT VERY IMPORTANT
IN THE WORKPLACE, THINK AGAIN.**

Nearly three out of five injured workers were not wearing
eye protection at the time of the accident or were wearing
the wrong kind of eye protection for the job.

Use our product and your eyes will be safe.

3.

For years, welders wanted to be protected from hot sparks, UV rays and hot metal.

Our company has produced a new type of material for your safety. It is durable and natural.

Now you will be safe and sound in these clothes.

4.

ARE YOU LOOKING FOR RELIABLE STEEL-TOED FOOTWEAR FOR WELDING?

Heat-resistant sole, minimal artificial materials, good protection around the toe and of course comfort.

Your feet will be protected from splashes and sparks.

7. Look at the pictures and name the objects.

1



2



3



4



5



6



7



8



9



10



11



12



13



14



15



16



8. Put the names of welding equipment into the correct group.

You put it on	Hand tools	Power tools

 **Speaking**

9. Answer the questions.

1. What equipment do you have in the workshop?
2. What is your favourite tool?
3. What tool is difficult to use?
4. What do you usually put on before welding?
5. What welding equipment would you like to buy?

**10. Read and complete the dialogue.
Guess where the action is taking place.**

- Good afternoon. Can I help you?
- Yes, please. I would like something to protect my hands while welding. Sorry, I forgot this word.
- Do you mean ... ?
- Yes, exactly.
- What colour?
- Grey, please.
- What size?

- L, Can I try them on?
- Sure. The gloves are excellent. They are durable, made of leather.
- Fine. What's the price?
- 15 dollars.
- Ok. I will buy them.
- Cash or a credit card?
- Cash.
- Thank you for your shopping.

11. In pairs, make up your own dialogue. Act it out.



Test

12. Complete the sentences using the given words and phrases.

ear defenders, grinding machine, goggles, measuring tape, steel-toed boots, steel wire brush, welding gloves, welding helmet, welding machine

1. To protect your head, you put on a
2. To protect your ears, you use
3. To finish your work, you need a
4. To keep your feet safe, you should wear
5. To make a weld, you use a
6. To protect your hands, you put on
7. To clean a metal before welding, you use a

8. To protect your eyes while welding, you put on
9. To mark centimetres, millimetres or metres, you need a



Homework



13. Make a project 'My Dream Workshop'. Use the prompts.

My workshop is

I would like to have

There would be

I would work with

Certainly, I would make

Besides, I would use

More than that, I would keep

In general, my workshop

Illustrate your ideas.

Lesson 10. WELDING TECHNOLOGIES



Tuning in

1. Let's revise.

1. What welding equipment do welders use?
2. What equipment do you always use?
3. What is your dream workshop?



Vocabulary

2. Guess what these words mean.

Control — ? Select — ? Visual — ?

Note!

finish	(гл.) завершать, отделять, обрабатывать
finishing	(сущ.) обработка, отделка
finished product	готовый продукт / товар

3. Learn the new words and phrases.

adjust	(гл.) приспосабливать, регулировать
cylinder	(сущ.) баллон
dimension	(сущ.) измерение, размеры, величина
edge	(сущ.) край, кромка
filler	(сущ.) присадочная проволока

manufacturer's specification	спецификация производителя
piece	(сущ.) кусок, часть
prepare	(гл.) приготавливать, подготавливать
proper	(прил.) правильный, нужный, корректный
set up	(гл.) устанавливать
take precautions	принимать меры предосторожности

4. Find the first letter in the words. Read and translate them.



5. Match the words in the columns to make phrases.

- | | |
|--------|-----------------------------|
| take | the equipment |
| set up | protective clothes |
| put on | precautions |
| select | the welding machine |
| adjust | dimensions |
| mark | a proper filler / electrode |



Reading

6. Read and translate the descriptions of activities in welding.
Put them in the correct order. Check.

Mark dimensions, using
a measuring tape or a caliper.

Prepare a piece of metal
you are going to work
with — clean it.

Cut the metal or weld it
according to the task.

Put on a welding mask,
protective clothes and gloves.

Edge finishing

Select correct filler material
and size to suit materials
being welded.

Set up welding equipment
according to the manufacturer's
specification.

Adjust welding equipment,
considering welding
parameters.

Take precautions necessary
for the safe use of power
tools and welding equipment.

Visual control.

7. Look at the pictures and name the activities in welding.



2



3



4



5



6



8. Answer the questions.

1. How do you organize your working process?
2. Is welding a difficult process?
3. What working activity is your favourite?
4. What activity takes most of time?
5. What is the most dangerous activity?



Word Formation

9. Form the new words. Read and translate them.

Example: equip (оборудовать) + ment = equipment (оборудование)

- 1) agree + ment = ...
- 2) advertise + ment = ...
- 3) enjoy + ment = ...
- 4) develop + ment = ...
- 5) pay + ment = ...
- 6) manage + ment = ...

10. Where can you hear these words (in politics / business / art / sports)?



Test

11. Complete the sentences using the given words.

adjust, clean, finish, make, mark, put, select, set, take

1. I must ... precautions for my safety at work.
2. I can ... up welding equipment.
3. To be safe, I should ... on a welding mask, gloves and protecting clothes.
4. I must ... the welding equipment to welding parameters.
5. To ... dimension is important.
6. It is not easy to ... a proper filler or electrode.
7. Before starting to work with a piece of metal, I need to ... it.
8. It is important to ... a weld properly.
9. In the end, I have to ... edges.



Homework

12. Make up sentences about your working process using the table. Express your opinion about it. Look up some words in the dictionary if necessary.

		cleaning metal.	
	enjoy	marking dimensions.	It is wise.
I	love	taking precautions.	It is necessary.
	like	welding and cutting.	It is useful.
	don't mind	putting on protective clothes.	It is exciting.
		edge finishing.	It makes me feel confident.

Lesson 11. TRADITIONAL TYPES OF WELDING



Tuning In

1. Let's revise.

1. What activities in welding technologies can you name?
2. What is the first thing to do?
3. What comes then?
4. What do you do at the end of the process?

A Vocabulary

2. Guess what these words and phrases mean.

Effect — ? Final — ? Oxyacetylene — ? Power tool — ? Propane — ? Result — ?
Semiautomatic — ? Specialist — ? Universal — ?

3. Learn the new words.

arc	(сущ.) дуга, арка
create	(гл.) создавать
direct	(гл.) направлять; (прил.) прямой
flame	(сущ.) пламя
generally	(нар.) обычно
overheat	(сущ.) перегрев; (гл.) перегревать
manual	(сущ.) руководство, справочник; (прил.) ручной

non-consumable	(прил.) неплавящийся (об электроде)
point	(сущ.) точка, цель
portable	(прил.) портативный, переносной
precision	(сущ.) точность, четкость, аккуратность
spool	(сущ.) катушка
tungsten	(сущ.) вольфрам
variety	(сущ.) многообразие, разнообразие, множество

4. Find the 5 new words in the line. Read and translate them.

portable manual arc tungsten spool

5. Complete the phrases using the new words.

- 1) ... welding
- 2) ... electrode
- 3) ... torch
- 4) ... a flame



Reading

6. Read and translate the text.

Many people think that there is only one type of welding, because they see a finished product.

In fact, there are many different types of welding.

Gas welding produces a flame from a burning gas. It creates the welding heat. The metals being welded together are heated to a high temperature to melt. Then a filler is added to the melted metal to make a strong connection. The oxygen and the fuel are mixed to create a flame. It can be directed along the metal to create the desired effect. The torch is moved by hand to control the process and final result.

Propane torch produces a low heat and can be used for small things. It is used to make joints or to solder two pieces of metal together.

Oxyacetylene torch makes the heat much hotter. Many specialists say it is a universal type of a welding tool. This type of torch welds lots of things. It is generally used when you want to cut, braze or solder something that needs a higher heat. You should be careful, it can overheat the area.

Arc welding uses a welding power tool to create an electric arc between an electrode and a base material to weld the metals at a welding point. Arc welding is widely used because it is not expensive.

Manual metal arc welding (MMAW) is a widely used process. The equipment can be portable and the cost is low. This process has many applications, because a wide variety of electrodes are used. A wide range of metals and their alloys can be welded.

Tungsten inert gas welding is known as a TIG. This is an arc welding process which uses a non-consumable tungsten electrode. TIG welding is popular when high quality and precision in welding are needed.

Gas metal arc welding (GMAW) is often called as MIG welding. Wire is continuously fed from the spool. It is a semiautomatic welding process.

7. Find in the text the English equivalents for the following Russian phrases.

- 1) существует множество видов сварки
- 2) создать пламя от горящего газа
- 3) запаять соединение
- 4) точка сварки

- 5) универсальный тип
- 6) может перегреться поверхность
- 7) неплавящийся вольфрамовый электрод
- 8) провод постоянно подается с катушки
- 9) полуавтоматический сварочный процесс

8. Answer the questions.

1. What types of welding can you name?
2. What does gas welding create?
3. What torches are used in gas welding?
4. What is the difference between them?
5. What does arc welding use? Why is it widely used?
6. What is special about TIG welding?
7. Why is TIG welding popular?
8. What is used in MIG welding?
9. Is it a semiautomatic welding process?
10. What type of welding can you do?
11. What is easier for you?
12. What is difficult for you?
13. What type of welding would you like to practise?

9. Look at the pictures and name the types of welding.



Speaking

10. Read and complete the dialogue. Guess who is taking part in the conversation.

- Good morning!
- Good morning!
- You will have a new task today.
- What kind of task?

- To weld pipes in the central heating system of the house number 12.
- Shall I use carbon ... welding?
- Definitely.
- Ok, it will be ready in an hour.
- Fine.

11. in pairs, make up your own dialogue. Act it out.



Test

12. Match the types of welding to their translations.

gas welding	сварка, при которой проволока непрерывно подается с катушки
arc welding	сварка вольфрамовым электродом
TIG welding	ручная сварка металлическим электродом
MMAW	газосварка
MIG welding	дуговая сварка

13. Match the types of welding to their definitions.

gas welding	creates an electric arc between an electrode and the base material
arc welding	creates a flame from a burning gas
TIG welding	wire is continuously fed from the spool
MIG welding	makes an arc between a coated consumable electrode and the workpiece
MMA welding	uses a non-consumable tungsten electrode



Homework



14. Fill in the table using the text.

Type of welding	Technology	Advantages	Disadvantages
1.			
2.			
3.			
4.			
5.			

Lesson 12. ALTERNATIVE TYPES OF WELDING



Tuning in

1. Let's revise.

1. What types of welding do you know?
2. What type of welding do you usually use?
3. What types of welding can you do well?

A Vocabulary

2. Guess what these words and phrases mean.

Diffusion — ? Laser beam welding — ? Microstructure — ? Pneumatic — ?
Press — ? Transform — ?

3. Learn the new words.

anvil	(сущ.) наковальня
apply	(гл.) применять, употреблять
cause	(сущ.) причина, основание, мотив; (гл.) быть причиной, служить поводом, вызывать
clamp	(сущ.) зажим, крепление; (гл.) скреплять, зажимать
cold	(прил.) холодный
consumption	(сущ.) потребление
cycle	(сущ.) цикл, процесс
deep	(сущ.) глубина; (прил.) глубокий
distortion	(сущ.) искажение, деформация

environment	(сущ.) окружающая обстановка, окружающая среда
explosive	(сущ.) взрывчатое вещество, взрывчатка; (прил.) взрывчатый
friction	(сущ.) трение
high-frequency	(сущ.) высокочастотный
joint	(сущ.) соединение, шов, стык
narrow	(прил.) узкий
punch	(сущ.) штамп, пробойник, компостер
rapid	(прил.) быстрый, стремительный, скоростной
require	(гл.) требовать, нуждаться, понадобиться
rotate	(гл.) вращаться, чередоваться
shrinkage	(сущ.) усадка, сокращение, сжатие
surface	(сущ.) поверхность
velocity	(сущ.) скорость

4. Find the 8 new words in the word puzzle.

Read and translate them.

c	s	a	p	p	l	y	w	a
d	i	f	f	u	s	i	o	n
f	u	s	e	n	c	t	e	v
v	e	l	o	c	i	t	y	i
c	o	l	d	h	t	m	o	l
c	x	p	l	o	s	i	v	e
r	o	t	a	t	e	e	b	h

5. Match the words in the columns to make phrases.

prepare	joints
make	velocity
explosive	surfaces
high	rotating
rapid	process



Reading

6. Read and translate the text.

Cold welding (CW). Cold welding uses a mechanical force or pressure to bring two metallic surfaces in contact. It is important to prepare surfaces well. No heat is used. Punch presses or pneumatic tools give pressure in the process. Cold welding is made by clamping the metals to be joined. It forms a metallurgical bond. The welding cycle is extremely short — typically less than 1 second.

Friction welding (FRW). Friction welding brings into contact two elements to be welded. One of the two is static and the other is rotated with a high velocity on its axis. Frictional heat makes materials plastic. Then the rotation is stopped and the welding is done. Friction welding is economical. Heat is produced cheaply, without arc or flame, without gases or fumes, without a protective atmosphere. Its quality control cost is minimal, with a guarantee of high-quality welds.

Laser beam welding (LBW). Laser beam welding uses light. High-energy beam makes narrow and deep joints with low heat input. No filler metal is required. It gives minimal distortion. The laser beam is transmitted through the air, and this type of welding is performed in the normal atmosphere (no vacuum needed). The laser beam easily welds difficult to join materials. It does not produce harmful X-ray radiation.

Diffusion welding (DFW). Diffusion bonding or welding produces a bond between base metals. It is made by a long time application of considerable pressure at high temperatures. It does not melt base metals. Dissimilar materials welds are possible. Properties and microstructures remain similar to those of base metals. Diffusion bonding causes minimal deformation. It presents less shrinkage and

stresses compared to other welding processes. This highly automated process does not need a skilful workforce, but a protective atmosphere or vacuum is needed. It is rather expensive.

Ultrasonic welding (USW). Ultrasonic welding joins metals or plastics by locally applying vibratory energy to workpieces pressed together. They are between an anvil and a sonotrode (horn). High-frequency ultrasonic acoustic vibrations are locally applied to workpieces. The vibrational energy is transformed in actual local heating that causes fusion. It has low energy consumption. Welding of incompatible materials is possible. No filler metal is needed and it is environmentally friendly.

Explosive welding (EXW). In explosion welding, high temperatures are generated in the explosive detonation. The result is an ideal metal to metal bond without melting or diffusion. The process can weld dissimilar metals, unsuitable for fusion welding. Mechanical properties are preserved in the process. The strength of the bonds is high. The set-up is simple and inexpensive. Large surfaces can be covered. Minimal surface preparation is required.

7. Make up sentences using the given words.

1. surfaces prepared well be must

2. frictional makes heat materials plastic

3. light welding uses beam laser

8. Answer the questions.

1. Do you need to heat metals in cold welding?
2. What are the main principles in friction welding?
3. When is laser welding made?
4. What are the advantages and disadvantages in diffusion bonding?
5. What good points can you name in explosion welding?

6. What types of alternative welding have you done already?
7. What type would you like to make?

Speaking

9. Read the dialogue and guess what type of welding is being discussed.

- Hello. What are you doing?
- Hi. I am going to weld. I think I will use a pneumatic tool.
- Do you need to heat the metals?
- No. No heating here.
- Did you prepare the surfaces well?
- Yes, I did. Perhaps I will start in 10 minutes.
- Be careful.
- Thank you. I will.

10. In pairs, make up your own dialogue. Act it out.



Test

11. Match the types of welding to their abbreviations.

ultrasonic welding	FRW
explosive welding	DFW
friction welding	USW
diffusion bonding	EXW
cold welding	LBW
laser beam welding	CW

12. Match the types of welding to their definitions.

cold welding	One part of the metal is static, the other one rotates with high velocity.
friction welding	No heat is used. Punch presses are used.
laser welding	It is made by the long-time application of considerable pressure at high temperatures.
diffusion bonding	The energy beam makes narrow and deep joints with low heat input.
ultrasonic welding	High temperatures are generated in the explosive detonation.
explosive welding	Metals are between an anvil and a vibrating probe.



Homework



13. Make a project 'Types of Welding'. Choose any type of welding described in the table and make a leaflet. Illustrate your story with pictures. Speak about:

- industries it is used in,
- its advantages,
- its disadvantages,
- metals used in this type of welding,
- what items are made,
- its application.

Lesson 13. SYMBOLS IN WELDING



Tuning in

1. Answer the questions.

1. What type of welding do you know?
2. What types of welding are you good at?
3. Do you remember what these abbreviations stand for?

FRW

USW

DFW

EXW

LBW

CW

A Vocabulary

2. Guess what these words mean.

Designer — ? Engineer — ? Inspector — ? Standardization — ? Symbol — ?
System — ?

3. Learn the new words and phrases.

enough	(нареч.) достаточно
flux	(сущ.) флюс
maintenance	(сущ.) техническое обслуживание
pipe	(сущ.) труба, предназначенная для транспортировки жидкости или газа; измеряется внутренний диаметр
pipeline	(сущ.) трубопровод
reference code	справочный код
shielding gas	защитный газ

society	(сущ.) общество, общественный строй
solve	(гл.) решать
submerge	(гл.) погружать (в воду), затоплять
supervisor	(сущ.) контролер, руководитель
technical specification	техническое описание
tube	(сущ.) труба, шланг; измеряется внешний диаметр, т. е. вместе с толщиной стенки

4. Fill in the missing letters in the words.

Read and translate them.

- 1) sct
- 2) shldnggs
- 3) ppn
- 4) tb
- 5) fIx
- 6) mnntnnc

5. Match the words in the columns to make phrases.

oil	system
symbol	industry
shielding	maintenance
pipe	gases
car	a problem
solve	line



Reading

6. Read the text and say what new information you have learned.

In the past, symbols for welded joints were simple. It was an arrow with the instruction 'Weld here'. It was not enough. To solve this problem, different welding symbols were made.

The American system of symbolization is the AWS system, formulated by the American Welding Society (AWS). This system became widely used in the world, mainly because of the oil industry. Today it is used by half the world's welding industry.

The rest of the world uses the ISO system, designed by the International Organization for Standardization (ISO). That's why we need to know the two systems. Welding symbols transmit information from the designer to one or more persons along the quality system network. This includes the welding engineer, welding supervisors, welders and inspectors. You can find the symbols in technical specifications and reference codes.

7. Find in the text the English equivalents for the following Russian phrases.

- 1) созданы различные символы для обозначения сварки
- 2) половина мировой сварочной индустрии
- 3) сетевые системы качества
- 4) контролер качества сварки
- 5) справочник кодов

8. Answer the questions.

1. What symbol systems are there in welding?
2. What do welding symbols mean?

3. Who needs the information?

4. Where can we find the information?

9. In the table below, you can find a list of welding processes. In the second column, you can see numbers specified in ISO 4063 and in the third column, the AWS reference codes of the American Welding Society. Learn about these processes from the table.

Arc Welding

Name	ISO	AWS	Characteristics	Applications
Carbon arc welding	181	CAW	Carbon electrode	Copper, repair (limited)
Flux cored arc welding	136 137	FCAW FCAW-S	Continuous consumable electrode filled with flux	Industry, construction
Gas metal arc welding	131 135	GMAW	Continuous consumable electrode and shielding gas	Industry
Gas tungsten arc welding	141	GTAW	Non-consumable electrode, slow, high-quality welds	Aerospace, construction (piping)
Plasma arc welding	15	PAW	Non-consumable electrode, constricted arc	Tubing, instrumentation
Shielded metal arc welding	111	SMAW	Consumable electrode covered in flux, can weld any metal as long as they have the right electrode	Construction, outdoors, maintenance
Submerged arc welding	121	SAW	Automatic, arc submerged in granular flux	Pipelines
Magnetically impelled arc butt	185	MIAB	Both tube ends are electrodes; no protection gas; arc rotates fast along edge by applied magnetic field	Pipelines and tubes



Speaking

10. Read the dialogue and name the type of arc welding in AWS and ISO.

- Good afternoon.
- Afternoon. What is my task for today?
- We must finish the pipeline. Use shielded metal arc welding.
- Is it ... or ... ?
- This one.

11. Read the dialogue and make up your own.

- Excuse me, what does GTAW mean?
- It means gas tungsten arc welding.
- Thank you. Now I know.
- Welcome.



Test

12. Match the types of arc welding to their numbers in ISO and AWS.

Type of welding	ISO number	AWS number
Carbon arc welding	181	GTAW
Flux cored arc welding	136	FCAW
Gas metal arc welding	131	PAW
Gas tungsten arc welding	141	CAW
Plasma arc welding	15	GMAW
Shielded metal arc welding	111	SMAW
Submerged arc welding	121	MIAB
Magnetically impelled arc butt	185	SAW

Homework

13. Complete the table.

Name	ISO number	AWS number	Russian translation
Carbon arc welding	181	CAW	Сварка дуговая угольным электродом
Flux cored arc welding	136	FCAW	Сварка дуговая порошковой проволокой с флюсовым наполнителем в активном газе
Gas metal arc welding	131	GMAW MIG	Сварка дуговая сплошной проволокой в инертном газе
Gas tungsten arc welding	141	GTAW TIG	Сварка дуговая вольфрамовым электродом в инертном газе с присадочным сплошным материалом (проводкой или стержнем)
Plasma arc welding	15	PAW	Сварка дуговая плазменная
Shielded metal arc welding	111	SMAW	Сварка ручная дуговая плавящимся электродом
Submerged arc welding	121	SAW	Сварка дуговая под флюсом сплошной проволокой
Magnetically impelled arc butt	185	MIAB	Сварка дугой, приводимой в движение магнитным полем

Lesson 14. RISKS AT WORK

WiFi Tuning in

1. Answer the questions.

1. Are you in a good form? Do you keep fit?
2. Do you play any sports? What is your favourite?
3. Do you have any health problems?
4. Can you name any parts of a human body?

A Vocabulary

2. Guess what these words and phrases mean.

Bronchitis — ? Cancerogenic — ? Central nervous system — ? Effect — ?
Pneumonia — ? Respiratory organs — ? Risk factors — ? Ultraviolet radiation — ? Ventilation — ?

3. Learn the new words.

blood	(сущ.) кровь
burn	(сущ.) ожог; (гл.) обжигать
develop	(гл.) развивать, совершенствовать
dust	(сущ.) пыль
emit	(гл.) излучать, испускать
fall	(сущ.) падение; (гл.) падать
fever	(сущ.) лихорадка

fume	(сущ.) дым, гарь, угар; (гл.) дымить, коптить
health	(сущ.) здоровье
hoarseness	(сущ.) хрипота, сиплость
illness	(сущ.) болезнь, заболевание
immediate	(прил.) мгновенный, спешный, срочный
inhale	(сущ.) вдох; (гл.) вдыхать
injury	(сущ.) рана, травма
irritate	(гл.) раздражать, сердить
kidney	(сущ.) почка
possible	(прил.) возможный, вероятный
skin	(сущ.) кожа
splash	(сущ.) всплеск, брызги; (гл.) разбрызгивать
unconsciousness	(сущ.) беспамятство, бесчувствие
vapour	(сущ.) пар, испарение
wet	(прил.) мокрый, влажный, сырой

4. Find the first letter in the words. Read and translate them.



1



2



3



4



5

5. Match the words in the columns to make phrases.

inhale	the skin
burn	dust
get	splashes
molten	injuries



Reading

6. Read and translate the text. Name risk factors in welding.

There are several risk factors in welding.

The arc gives extremely bright light and ultraviolet radiation. They can damage eyes. Molten metal splashes and sparks can burn the skin. They can also cause a risk of fire.

The dangers of slips and falls exist in a welding operation. They cause injuries. There can be hazardous situations — fire can happen if there are flammable materials near. Wet areas are also risky.

Noise makes ears ache.

The fumes made in welding can be dangerous when inhaled. If a welder inhales gases, fumes and vapours a lot during long periods, it can have a negative effect on his health.

Health risks when inhaling welding fumes:

Risk factors	Possible immediate effects	Possible long-term effects
		Fume / dust
Welding fume	Hoarseness, sore throat, eye irritation, metal fume fever	Bronchitis, toxic
Nickel, zinc, copper	Metal fume fever	Cancerogenic

Continued on p. 95

Risk factors	Possible immediate effects	Possible long-term effects
Aluminium	Irritation of respiratory organs, metal fever	—
Manganese	Pneumonia	Damage to the central nervous system
Lead	—	Changes in blood and kidneys, toxic
Gases		
Nitrogen oxide	Irritation of bronchial tubes and eyes	Bronchitis
Carbon monoxide	Difficulty in breathing, unconsciousness	Toxic

What is metal fume fever? It is a potentially fatal form of hazardous materials exposure where people inhale toxic fumes from heated metals. Patients inhale magnesium oxide and zinc oxide, both are known as respiratory irritants, and these oxides can develop serious illnesses.

People develop metal fume fever when they work in poorly ventilated environments with metals they are heating. A blood test can show abnormally high concentrations of metals in the blood. It is important to use ventilation over workspaces. Typical treatment for this professional illness is resting in bed, drinking lots of fluids and taking aspirin. Patients can get well in two to four days from metal fume fever.

7. Answer the questions.

1. What are the symptoms of metal fume fever?
2. Why does it happen?
3. What are the precautions?
4. What is the treatment of the illness?
5. You have had some practice in welding already. What risks have you met?



Word Formation

8. Form the new words.

Read and translate them.

Example: hoarse (хриплый) + ness = hoarseness (хриплость)

- 1) happy + ness = ...
- 2) sleepless + ness = ...
- 3) dark + ness = ...
- 4) conscious + ness = ...
- 5) hard + ness = ...
- 6) sick + ness = ...
- 7) ill + ness = ...

9. Make up your own sentences using the new words from exercise 8 and the prompts.

I've got

Sometimes I feel

I dislike



Speaking

10. Read and complete the dialogue. Guess who is taking part in the conversation and where it is taking place. What health problems is the patient having?

- Good morning!
- Good morning!
- What has happened?
- You see, I am feeling unwell. It is difficult to breathe.
- Your voice is hoarse. Your eyes are irritated. Are you a ... ?
- Yes, I am. I have been ...ing for three years.
- Inhaling dangerous fumes and dust is bad for you. You should take precautions at work. Stay at home for four days; take aspirin three times a day, drink a lot of liquid. Get well.
- Thank you.

11. In pairs, make up your own dialogue. Act it out.



Test

12. Match the risks to their negative effects.

Extremely bright light	burn the skin.
Molten metal splashes	causes injuries.
Inhaling fume / dust	causes difficulty in breathing, unconsciousness.
Falling down	causes hoarseness, bronchitis.
Inhaling gases	hurts eyes.

13. Complete the sentences using the correct forms of the words in capitals.

- | | |
|--|----------|
| The arc emits (1) ___ bright light. | EXTREME |
| (2) ___ metals splash. | MELT |
| (3) ___ is a negative effect of hard work. | SLEEP |
| Inhaling (4) ___ fumes is bad. | DANGER |
| (5) ___ of eyes is a common problem. | IRRITATE |



Homework

14. Draw a man schematically. Point out human's organs which can be damaged by welder's professional hazards. Write down the dangers.

Lesson 15. SAFETY RULES IN WELDING

Wifi Tuning in

1. Let's revise.

1. What professional risks in welding do you know?
2. What is the most dangerous?
3. What risks have you met in your practice?

A Vocabulary

2. Guess what these words and phrases mean.

Adequate — ? Concentration — ? Danger zone — ? Legal — ?
Non-flammable — ? Respirator set — ? Ventilation — ?

Note!

cylinder	(сущ.) баллон, цилиндр
outsider	(сущ.) посторонний

3. Learn the new words and phrases.

confined place	закрытое помещение
deface	(гл.) портить, уродовать, стирать, искашать
expose	(гл.) подвергать, выставлять, обличать
fire extinguisher	(сущ.) огнетушитель
first aid	первая помощь
hazard	(сущ.) бедствие, опасность

humid	(прил.) сырой, влажный, мокрый
insulate	(гл.) отделять, ограждать, изолировать
leak	(сущ.) утечка
pay attention	обращать внимание
slag	(сущ.) шлак
worksite	(сущ.) рабочее место

4. Find the 5 new words in the line. Read and translate them.

insulate hazard expose leak humid

5. Match the words in the columns to make phrases.

pay	leak
gas	attention
fire	aid
first	extinguisher

Reading

6. Read and translate the instructions.

These hazards can be avoided. Take the following precautions.

Fire. Remove flammable materials from the worksite. Fire extinguishers must be located near your worksite.

Do not weld containers containing flammable materials.

Do not work in conditions where there are high concentrations of flammable dust.

Outsiders are not allowed to enter the danger zone.

Burns. Protect your body by wearing fireproof clothing. This will protect your skin against burns caused by ultraviolet radiation given off by the arc, sparks and molten slag.

The protective clothing should include the following: gloves, a hat, an overall and steel-toed boots. Wear a helmet equipped with the appropriate lens shade and a clear glass cover plate. You must do it to protect your eyes from ultraviolet arc rays and molten splashes.

Hot metal, electrodes and other consumables should never be handled without gloves.

First aid equipment and a qualified first aid person should always be near when welding, to treat flash burns of the eyes and skin burns.

Fumes. Welding operations produce harmful fumes and metal dusts which are hazardous for your health. During some welding operations, phosgene gas can be created. Gas leaks in confined spaces should be avoided. Leaked gas in large quantities can dangerously alter oxygen levels in the air of the weld site.

Work in well-ventilated areas. If ventilation is inadequate, use a respirator set.

Explosions. Do not weld above or near containers under pressure.

Do not weld in environments containing explosive dusts, gases or vapours. Pay attention to gas cylinders.

Never deface or alter the name, number or other markings on a cylinder. It is illegal and dangerous! Do not use cylinders with unidentified contents. Use pressure cylinders with care and in conformity with existing safety standards. Do not use leaking or damaged cylinders. Never try to mix gases in a cylinder. Never refill a cylinder! Never allow an electrode to touch a cylinder!

Do not expose cylinders to excessive heat, sparks, molten slag or flames.

Radiation. Wear proper clothing and a helmet. Use a mask or helmet equipped with lens shades that have a minimum DIN rating of 10 (rate 1 is the lightest, rate 13 is the darkest). Never look at an arc without eye protection!

Replace protective lenses when they are damaged or broken.

Electric shock. Electric shocks are hazardous and potentially fatal! Insulate yourself from the workpiece and the ground by wearing insulated gloves and clothing. Keep gloves, shoes, hats, clothing and body dry.

Do not work in humid areas. If you are welding near a body of water, take precautions to ensure that the machine cannot fall into the water.

Noise. Welding processes can produce noise levels in excess of 80 dB. In this case, a welder must put on ear defenders.

7. Find in the text the English equivalents for the following Russian phrases.

- 1) убрать воспламеняющиеся предметы
- 2) посторонним вход воспрещен
- 3) ультрафиолетовое излучение
- 4) заменить поврежденные линзы
- 5) уровень шума, превышающий...
- 6) необходимые меры безопасности

8. Look at the signs, name the danger and precautions to be safe.



Speaking

9. Answer the question.

What do you always do to be safe while welding?

10. Read the dialogues and choose the correct variant in the sentences.

1.

- It is so noisy here.
- Yes, it is. Where are my *ear defenders / goggles*?
- Here you are.
- Thank you.

2.

- Ventilation doesn't work here.
- Put on *gloves / a respiratory set*.
- Ok.

11. In pairs, make up your own dialogue. Act it out.

Test

12. Finish the sentences.

1. If you want to be safe,
2. If you want to escape the risk of fire,
3. When you are in a humid space,

4. When you are in a confined space, ...
5. If there is much noise, ...
6. When the arc gives bright light, ...
7. When you deal with molten metal, ...
8. To protect your feet, ...
9. To protect your hands, ...



Homework

13. Fill in the tables using the text.

Danger zones	Risks	Precautions
1. Confined space	Fumes, dust, gases	Ventilation
2.		
3.		
4.		

Hazards	Health damages	Precautions
1. Noise	Earache	Ear defenders
2.		
3.		
4.		

Lesson 16. INSTRUCTIONS. GENERAL SPECIFICATIONS OF A WELDING MACHINE

WiFi Tuning in

1. Answer the questions.

1. Do you read instructions?
2. Do you always follow them?
3. Are instructions important to follow?

A Vocabulary

2. Guess what these words and phrases mean.

Display — ? Function — ? Phase — ? Inverter — ? Serial number — ? Single — ?

3. Learn the new words and phrases.

alternating current (AC)	переменный ток
class of insulation H	изоляция класса Н (самый высокий класс изоляции. Максимальная температура нагревания — 180 °C)
direct current (DC)	постоянный ток
machine plate	металлическая пластина с техническими данными
net weight	масса нетто, чистая масса
power source	источник питания
A/V — A/V	Указывает диапазон (предел) регулирования сварочного тока (минимальный — максимальный) при соответствующем напряжении дуги

I1 Max. Absorbed current	Максимальный потребляемый ток
I1 eff. This is the maximum value of the actual current absorbed, considering the duty cycle	Максимальный действующий (эффективный) потребляемый ток, соответствующий рабочему циклу
I2. Welding current	Сварочный ток
U2. Secondary open circuit	Вторичное напряжение сварочного трансформатора при холостом ходе
U1. Rated supply voltage	Номинальное напряжение питания
1 – 50/60 Hz; 50 or 60 Hz	1 – 50/60 Гц; 50 или 60 Гц
Single-phase power supply	Однофазное электропитание
I1. Absorbed current at the corresponding current I2	Ток потребления на соответствующий ток I2
IP23. Protection grade of the housing, approving the equipment as suitable for use outdoors in the rain	Степень защиты корпуса IP23. Оборудование можно использовать вне помещения, под дождем
S. Suitable for hazardous environments	Указывает на то, что сварочные работы могут выполняться в местах с повышенной опасностью поражения электрическим током (например, вблизи от больших металлических масс)
U0	Напряжение между фазой и «землей»
X. Duty cycle during which the welding machine may run at a certain current without overheating	Рабочий цикл, при котором сварочный аппарат может работать без перегрева

4. Fill in the missing letters in the words.

Read and translate them.

1) crmt

2) vltge

3) mchn plt

4) wght

5) dmnsn

5. Match the words in the columns to make phrases.

direct

plate

machine

current

power

cycle

duty

insulation

class of

source

Reading

6. Read and translate the text.

General specifications. This welding machine is a direct and alternating current power source built using INVERTER technology, designed to weld covered electrodes (not including cellulosic) and for TIG procedures. By selecting TIG AC welding mode, you may weld aluminium, aluminium alloys, brass and magnesium. Selecting TIG DC allows you to weld stainless steel, iron and copper.

The technical specifications are listed on the machine plate.

		No			
EN 60 974.1 IEC 974.1					
 		-A/-V--A/-V			
X _{40°C}		40 %	60 %	100 %	
	U_0	I ₂	A	A	A
MUG-MAG	PEAK	U_2	V	V	V
3~	U_1	I ₁	A	A	A
50/60Hz	U_1	I ₁	A	A	A
PROTEZIONE TERMICA TERMAL PROTECTION PROTECTION THERMIQUE THERMISCH GE SCHÜTZT PROTECCIÓN TÉRMICA			VENTILAZIONE FORZATA FORCED VENTILATION VENTILÉ KÜHLADTF VENTILACIÓN		
CLASSE DI ISOLAMENTO CLASS OF INSULATION CLASSE DES ISOLANTS ISOLIERSTOFFKLASSE CLASE DE AISLAMIENTO			H		IP 21
			MADE IN ITALY		S

Block protection. In the event of a malfunction, a flashing number may appear on the display M, with the following meaning:

52 = start button pressed during start-up,

53 = start button pressed during thermostat reset,

56 = extended short-circuit between the welding electrode and the material to be welded. Shut the machine off and turn it back on. If different numbers appear on the display, contact technical service.

This machine is protected by a thermostat, which prevents the machine from operating if the allowable temperatures are exceeded. In these conditions, the fan continues to operate and the display M flashes the abbreviations.

7. Answer the questions.

- Where can you find the information about specifications of any welding machine?
- What types of welding can you make using this machine?

3. What metals can you weld using this machine?
4. What have you learned about the parameters of the machine?
5. What specifications make the welding machine safe?



Word Formation

8. Form the new words. Read and translate them.

Example: mal (плохой, несправедливый) + function (работа) =
— malfunction (некорректная работа, неправильное срабатывание)

- 1) mal + adjusted (настроенный) = ...
- 2) mal + practice = ...
- 3) mal + formed = ...

9. Complete the sentences with the new words from exercise 8.

1. I haven't read the instruction, that's why the machine is
2. Look! Something is wrong with the pipe. It is
3. I have done all wrong. It was



Speaking

10. Read and complete the dialogue. Say where the conversation is taking place.

- Excuse me. Can you help me?
— Sure,
— I want to use the welding machine. Can you explain what TIG AC welding mode means?

- By selecting this mode, you can weld ..., aluminium ..., ... and magnesium.
- And TIG DC?
- You can weld stainless steel, ... and
- Thank you. Now I know.
- Welcome.

11. In pairs, make up your own dialogue. Act it out.



Test

12. Match the parameters in the columns.

Model	30—150
Welding current range A	Kit Praktic
Duty cycle 100%	1 × 12 mm/min
Wire feeding speed	1 × 230 V
Power supply	IP23 S
Protection degree	45
Dimensions	26 kg
Weight	590 mm × 250 mm × 420 mm



Homework

13. Find one more example of a machine plate with specifications in English. Show it to your groupmates. Listen and check their interpretation.

Lesson 17. CHARACTERISTICS AND EQUIPMENT OF A WELDING MACHINE



Tuning in

1. Let's revise.

1. What are the main parameters of a welding machine?
2. What do the following abbreviations stand for?

AC

DC

S

IP23

I_{max}I_{eff}

A Vocabulary

2. Guess what these words and phrases mean.

Adapter — ? Amperemeter — ? Antivibrational system — ? Balance — ?
Block — ? Cable — ? Coolant system indicator — ? Potentiometer — ?

Note!

cycle	(сущ.) цикл, процесс; (прил.) циклический
regulator	(сущ.) регулятор, редуктор, стабилизатор

3. Learn the new words and phrases.

adjustment	(сущ.) настройка, регулировка, корректировка
clamp	(сущ.) струбцина, тиски, держак
dual	(прил.) двойной

earth (ground) wire	заземленный провод
enable	(гл.) делать возможным, активировать, задействовать
flow meter	(сущ.) счетчик расхода (жидкости, газа)
high performance	высокие рабочие характеристики, высокая эффективность
low consumption	низкое потребление (энергии)
no touch ignition	бесконтактное, сенсорное зажигание
power cord	шнур питания
remote control	пульта управления
run out	(гл.) закончиться
shielding gas	защитный газ
valve	(сущ.) клапан, вентиль

4. Find the 11 new words in the word puzzle.
Read and translate them.

d	u	a	l	m	c	k	e
v	a	l	u	e	h	p	o
i	g	n	i	t	i	o	n
c	o	r	d	e	g	w	t
f	l	o	w	r	h	c	r
r	e	m	o	t	e	r	o
t	o	u	c	h	n	b	l

5. Complete the phrases using the new words.

- 1) power ...
- 2) earth ...
- 3) remote ...
- 4) shielding ...
- 5) coolant ...
- 6) adaptor ...
- 7) flow ...
- 8) high ...
- 9) low ...



Reading

6. Read and translate the characteristics of a welding machine.

Characteristics and equipment:

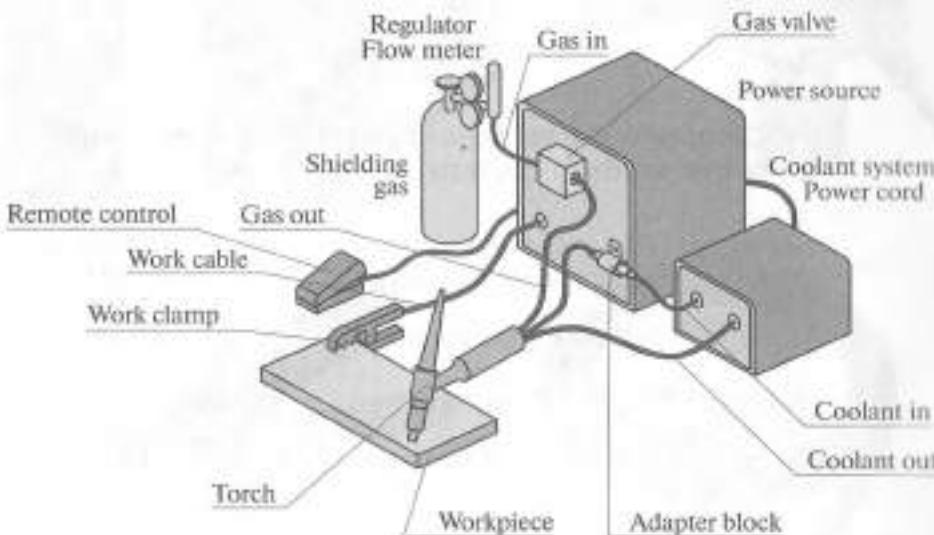
- low consumption of energy and high performance,
- very good welding qualities with methods TIG and MMA,
- low weight and small size,
- digital display,
- easy control of all parameters with potentiometers,
- adaptor block,
- temperature protection with indicator,
- no touch ignition HF,
- enables adjustment of gas flow, current run out, end welding current, balance AC,
- remote control connector (possibility of connecting manual remote control or foot-operated — pedal),

- two-cycle and four-cycle,
- amperemeter,
- welding torch 8 m long,
- earth wire,
- welding cables.

7. Answer the questions.

1. What characteristics of the welding machine do you like most?
2. What characteristics make welding safer / easier / quicker?
3. What characteristics can be improved?
4. Would you like to weld using this machine?

8. Look at the picture. Read and translate the names of the equipment.





Speaking

9. Read and complete the dialogue. Guess where the conversation is taking place.

- Good afternoon.
- Afternoon.
- I am going to have TIG welding today. What machine can I take?
- Take the inverter. It has low ... and small It welds very well.
- Yes, I know. It shows ... performance. Where is a ... control?
- It is behind you. Here it is.
- Oh, thank you for your help.
- You are welcome.

10. In pairs, make up your own dialogue. Act it out.



Test

11. Complete the sentences using the correct forms of the words in capitals.

- | | |
|---|--------------------|
| Low energy (1) ____ and high
(2) ____ are very important in welding. | CONSUME
PERFORM |
| An (3) ____ block makes the process safer. | ADAPT |
| (4) ____ systems are necessary. | COOL |
| A remote control (5) ____ is also a must have. | CONNECT |

12. Complete the words. The first letter is given.

1. An inverter **m**___ has the following characteristics.
2. It has a good **t**___ protection, **l**___ energy consumption and **h**___ performance.
3. It is convenient to have a digital **d**___ and a **r**___ control.
4. The inverter has a **t**___, **g**___ bottle, welding **c**___, earth **w**___.
5. Besides, it has **e**___ and **a**___ systems.



Homework

13. Look at the pictures and label the objects.

1



2



3



4



5



Lesson 18. INSTALLATION. FRONT AND REAR PANELS OF A WELDING MACHINE

FM Tuning in

1. Let's revise.

1. Can you name any items of a welding / inverter machine?
2. What characteristics of a welding machine do you know?

A Vocabulary

2. Guess what these words and phrases mean.

Active — ? Adequate — ? Central adapter — ? Connect — ? Negative — ?
Panel — ? Positive — ? Recommend — ? Service function — ?

3. Learn the new words and phrases.

arc length	длина дуги
brief	(прил.) короткий, недолгий
button / knob	(сущ.) кнопка
capacity	(сущ.) мощность, емкость
confirm	(гл.) подтверждать
cutout switch	автоматический выключатель
earth pin	заземляющий стержень
extension lead	удлинитель
hold	(гл.) удерживать, владеть, иметь

install	(гл.) устанавливать, вводить в действие
installation	(сущ.) установка, сборка, монтаж
light-emitting diod (LED)	светоиспускающий диод, светодиод
make sure	(гл.) убедиться, удостовериться
manufacturer's setting	настройки изготовителя
overload	(сущ.) перегрузка; (гл.) перегружать
plug	(сущ.) вилка, штекер; (гл.) подключать, вставлять, затыкать
power supply cable	кабель питания
rear	(прил.) задний, тыльный
return	(сущ.) возвращение; (гл.) возвращать(ся)
socket	(сущ.) розетка (электрическая)
thickness	(сущ.) толщина
via	(предл.) через, с помощью
warning	(сущ.) предупреждение, предостережение
wire speed	скорость подачи проволоки

4. Find the first letter in the words. Read and translate them.

1. *soct*

2. *soct*

3. *stallation*

4. *suchcutout*

5. *overload*

1

2

3

4

5

5. Match the words in the columns to make phrases.

arc	a button
wire	function
service	speed
hold	switch
cutout	length

! Reading

6. Read and translate the text.

Front Panel



Make sure that the supply voltage matches the voltage indicated on the specifications plate of the welding machine. When mounting a plug, make sure it has an adequate capacity, and that the yellow / green conductor of the power supply cable is connected to the earth pin. The capacity of the overload cutout switch or fuses is installed.

Selection key V. Each brief pressure selects the size, adjustable via the knob I. The values that can be selected are in relation to the type of welding process selected, and are displayed on the LEDs A / B / C / D. Holding the key down for more than three seconds will open the 'service functions' menu. Within the 'service functions', holding the button down returns the selected function to the manufacturer's setting; pressing it briefly confirms the changes made and returns to welding.

LED A Current. Indicates that the display M shows the reset welding current. Active in all welding processes.

LED B Wire speed. Indicates that the display M shows the MIG welding wire speed.

LED C Thickness. The display M shows the recommended thickness of the metal based on the current and wire speed set for MIG welding.

LED D PROG. Selected via the button V, and using the knob I sets:

- the numbers of the programs for MIG welding and TIG and MMA welding processes,
- the numbers and abbreviations shown on the display M.

Knob I. In relation to the selected LED, regulates:

- welding current, LED A, in any welding process,
- wire speed (LED B), thickness of the metal (LED C) in MIG welding,
- number of the MIG program or TIG or MMA welding processes.

In the service functions select the abbreviations:

- for MIG: trg, SP, SPT, int, HSA, SC, SCT, slo, PrF, PoF, Acc, bb, L,
- for MMA: AF, tHS, knob L,
- in MIG it adjusts the welding voltage, changing the arc length.

Within the 'service functions' menu based on the abbreviation of the function set via the knob I activates and / or adjusts it.

Display M.

- In all welding processes, it numerically displays the selections made via the button V and adjusted via the knob I.
- For the welding current (LED A) it displays the amperes.
- For the wire speed (LED B) it displays the metres per minute.
- For the thickness of the welded metal (LED C) it displays the millimetres.

E — Central adapter. This is where the welding torch is connected.

F — Knob. Switch ON / OFF.

G — Negative socket. In MMA and MIG welding with gas, the earth cable connects here; in TIG and MIG welding with flux-cored wire without gas, insert the torch power cable.

H — Positive socket. In MMA welding, connect the electrode clamp; in MIG with gas, the power cable leaving the torch; in TIG and MIG welding with flux-cored wire without gas, the earth cable.

Rear Panel

E — 230V power supply socket. 440 W max. power. For cooling unit only. (Warning: Do not connect other equipment to this socket!)

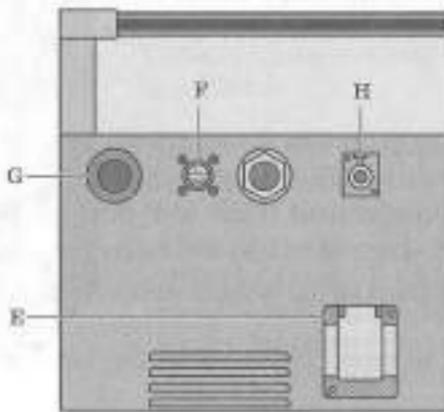
F — 6-pin socket connector. For the 6-pin plug connector on extension lead.

G — Socket. For the extension lead power supply connector ('+' pole).

H — Socket. For connection to the safety device on the cooling unit.

Note! If no cooling unit is used with the machine, plug the connector supplied with the machine into the socket H.

Remember to switch off the machine, close the gas cylinder valve and disconnect the power source, when you have finished welding. Remove the electrode from the clamp after welding.



7. Find in the text the English equivalents for the following Russian sentences and phrases.

- 1) Убедитесь, что напряжение питания соответствует напряжению, указанному на табличке с техническими данными.
- 2) Желтый / зеленый провод питающего кабеля подключен к контакту заземления.
- 3) предохранители установлены
- 4) каждое короткое нажатие кнопки
- 5) определить тип сварочного процесса
- 6) выводится на светодиоды
- 7) закрепить выбранный тип в «Рабочих функциях» меню
- 8) регулировать сварочное напряжение
- 9) изменение длины дуги
- 10) скорость подачи проволоки
- 11) возвращаться от выбранных настроек к настройкам изготовителя
- 12) гнездо положительного заряда
- 13) гнездо отрицательного заряда
- 14) подключение держателя электрода
- 15) По окончании сварки всегда выключайте аппарат.
- 16) закрыть газовый вентиль
- 17) убрать электрод из держателя

8. Answer the questions.

1. What do you do when you install a welding machine?
2. How can you open the 'service function' menu?
3. What do the LEDs A, B, C, D mean?
4. What does display M show?
5. Where do you connect the earth cable in MIG and MMA?
6. Where do you connect the electrode clamp in MMA?
7. What precautions should you take?
8. What should you do with the welding machine when you have finished welding?



Speaking

9. Read and complete the dialogue. Guess where the conversation is taking place.

- Excuse me, I need your help.
- Yes, please.
- Where can I connect the electrode clamp?
- Look here. This is It connects the electrode clamp in MIG welding.
- Thank you so much.
- Any time.

10. In pairs, make up your own dialogue. Act it out.



Test

11. Choose the correct variant.

1. Each *brief / long* pressure selects the parameters.
2. *Taking / Holding* the key down for more than three seconds will open the 'service functions' menu.
3. LED B displays *metres / centimetres per minute / second*.
4. Central adapter. This is where the welding *torch / clamp* is connected.
5. Two-pin socket. This is where the MIG torch control *cable / wire* connects.
6. Negative socket. In MMA and MIG welding with gas, the *earth / power* cable connects here.

12. Complete the words in the phrases and translate them. The first letter is given.

- 1) c ___ a ___
- 2) a ___ l ___
- 3) c ___ s ___
- 4) n ___ s ___



Homework

13. Find one more example of any front panel of a welding machine with specifications in English. Show it to your groupmates. Listen and check their interpretation.

Lesson 19. TYPES OF WELDING JOINTS, BEADS AND POSITIONS

Listening

1. Let's revise.

1. What can you see on the front and rear panels of a welding machine?
2. What are the main rules for installing a welding machine?

A

Vocabulary

2. Guess what these words mean.

Configuration — ? Horizontal — ? Manipulation — ? Maximum — ?
Parallel — ? Perpendicular — ? Position — ? Vertical — ?

3. Learn the new words and phrases.

across	(прел.) по, поверх, через
angle	(сущ.) угол
butt weld	стыковое соединение
corner	(сущ.) угол; (прил.) угловой
cover bead	многопроходная (многослойная) сварка
edge joint	торцевое соединение
fillet weld	заполнение углового шва
flash weld	стыковая сварка отлавлением
from side to side	из стороны в сторону

groove weld	стыковой шов
lap joint	соединение внахлестку
make a run	сделать прогон
penetration	(сущ.) проникновение
plane	(сущ.) плоскость
pull	(гл.) тянуть, тащить
push	(гл.) продвигать, проталкивать
slight	(прил.) легкий
slot /plug weld	прорезной сварной шов
spot weld	точечный сварной шов
string bead	ниточный шов
surfacing weld	наплавка
tack weld	короткий сварной шов
weave bead	уширенный валик
welding puddle	сварочная ванна; часть сварного шва, где основной металл достиг точки плавления

4. Find the first letter in the words. Read and translate them.



1

2

3

4

5

5. Complete the phrases using the new words.

- 1) slight ...
- 2) from side to ...
- 3) lap ...
- 4) weave ...
- 5) welding ...
- 6) tack ...



Reading

6. Read and translate the text.

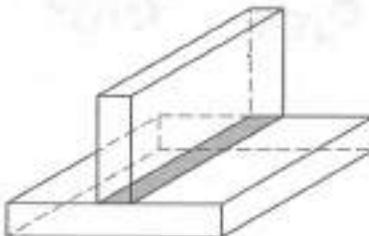
Joints

There are five main types of joints.

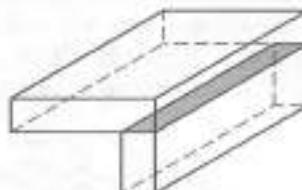
Butt joints are joints where two pieces of metal are joined in the same plane. They are the most common or the easiest to do. This type of joints is widely used in joining pipes, valves and other equipment.



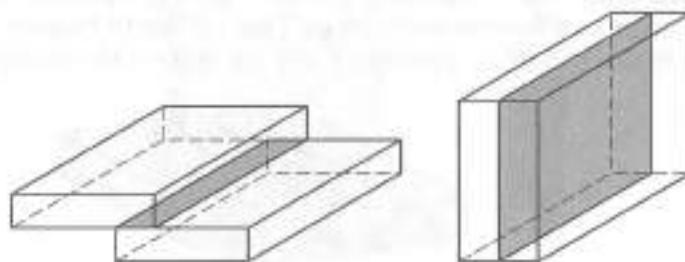
The **tee butt joint** is formed when two bars or sheets are joined perpendicular to each other in the form of a T shape.



The **corner joint** is used to connect two pieces together forming a corner. It creates a right angle. This joint is often used in the sheet metal industry.



The **lap joint** is a joint between two pieces of metal in which the edges or ends are overlapped and fastened together. It is the strongest joint. Full-lap and half-lap joints are the most commonly used.



Welds and Beads

There are different types of welds and beads.

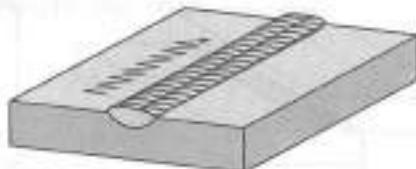
Edge weld. The edge weld is a joint where two pieces of metal are placed together and welded on the same edge.



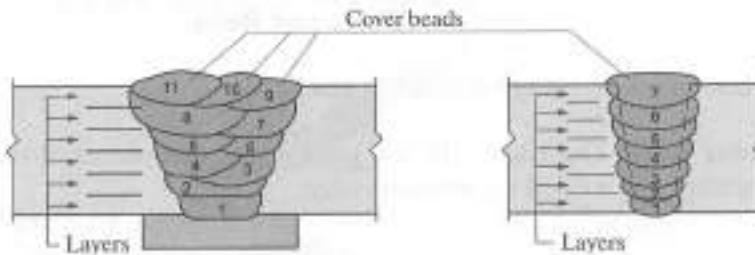
Stringer bead. This is a straight forward bead. It is easy to perform. You pull or push the torch towards / across the joint with a minimal (if any) side to side movement. It enables maximum penetration. The side to side manipulation is slight. Stringer beads are not very wide. Sometimes moving the torch along slowly is enough, so the weld puddle flows over both sides of the joint. This type of beads is used in making industrial equipment.



Weave bead. For wider welds, you can weave from side to side. It is typically used on groove welds or wider joints. This welding technique is most commonly used in the vertical up position. There are many different types of weaves.



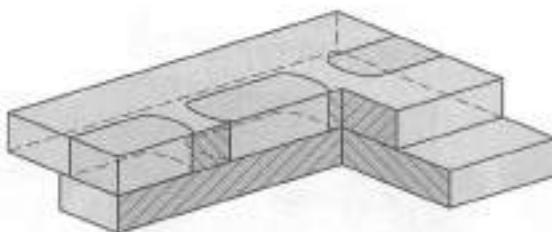
Cover beads. These beads are produced by making several runs.



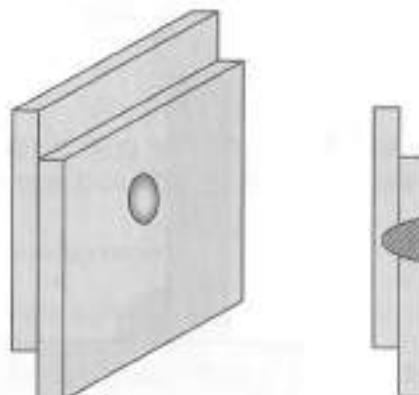
Basic Weld Types



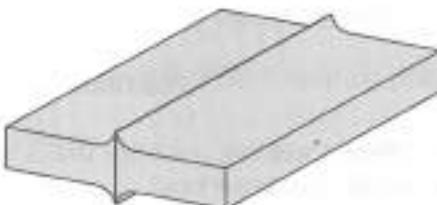
Single groove weld



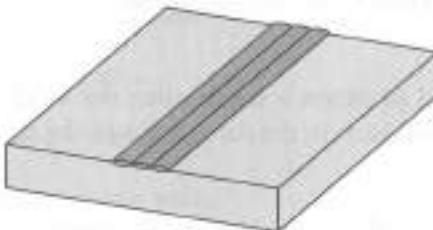
Slot welds



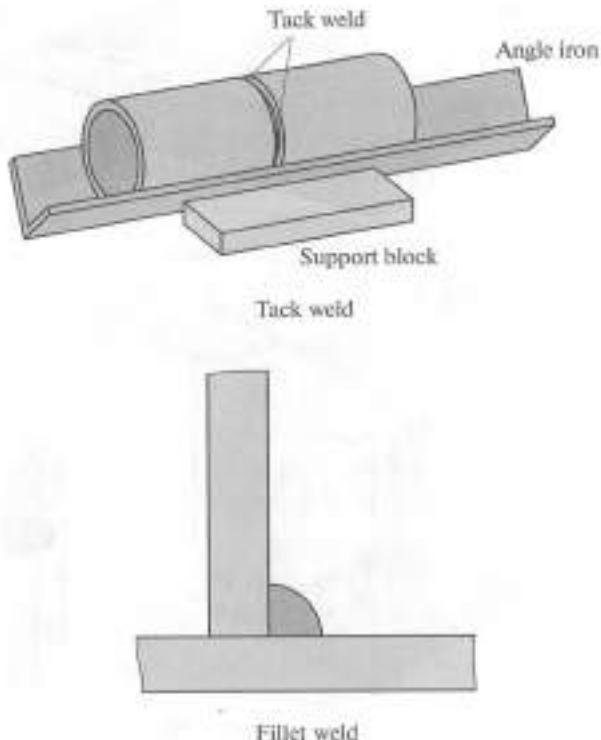
Spot weld



Flash weld



Surfacing weld



Positions

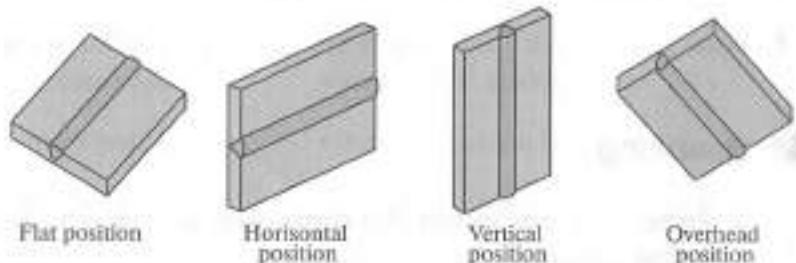
There are four different welding positions that a welder can use when welding flat, horizontal, vertical and overhead.

The **flat position** is the simplest of the four. When welding in this position, the material should be parallel to the floor. It is the most comfortable position to weld in.

The **horizontal position** is taken when the welding material is at a right angle to the floor. You need to practise, because the molten puddle tends to sag due to gravity.

The **vertical position** is used when the metal to be welded is at a right angle to the floor.

The **overhead position** is the most difficult and the most uncomfortable position because the molten metal has a tendency to form drops and fall down.



**7. Guess what type of a welding joint / bead / position it is.
Two answers are possible in some cases.**

1. The joint has a T configuration.
2. The angle in this joint is 90 degrees.
3. It is made by lapping one piece of metal over another.
4. This bead is used for wider joints.
5. You have to make many runs to produce this type of a bead.
6. This is the most dangerous and difficult welding position.
7. The joint has an L shape.

8. Answer the questions.

1. What types of joints can you name?
2. What joints are often used?
3. What types of beads do you know?
4. What welds or beads can you make?
5. What is difficult to make?

6. What welding positions can you weld in?
7. What welding position do you often weld in?
8. What is the easiest / the most difficult welding position for you?



Speaking

9. Read and complete the dialogue. Guess who is taking part in the conversation.

- I have to make a weld. What bead shall I use?
- Let me think. The joint is rather wide.
- What about a ... bead?
- I agree. You have to move slightly from side to Can you?
- I think I can. The welding position is the most uncomfortable.
- The ... position is not my favourite.
- Be careful.

10. In pairs, make up your own dialogue. Act it out.



Test

11. Match the names of the joints to their Russian translations.

butt joint	угловое соединение
tee joint	стыковое соединение
corner joint	соединение внахлестку
lap joint	торцовое соединение
edge joint	тавровое соединение

12. Match the names of the welds and beads to their Russian translations.

cover bead	ниточный шов
stringer bead	уширенный валик
weave bead	многопроходная (многослойная) сварка
tack weld	стыковая сварка оплавлением
flash weld	короткий шов, прихватка
surfacing weld	прорезной сварной шов
slot weld	точечный шов
spot weld	наплавка

13. Match the names of the positions to their Russian translations.

flat position	горизонтальное положение
horizontal position	вертикальное положение
vertical position	потолочное положение
overhead position	нижнее положение



Homework



14. Choose any joint / weld / bead and make a leaflet about it. Tell about:

- its name,
- its types (different kinds),
- its technology (how it is made),

- welding positions it is made in,
- its advantages,
- its disadvantages,
- its application.

Illustrate your project work.

Lesson 20. WELDING DEFECTS



Tuning in

1. Let's revise.

1. What types of welding joints or beads do you know?
2. What welding positions can you name?
3. Tell about the one you chose for your project work. Show the illustrations.

A Vocabulary

2. Guess what these words mean.

Defect — ? Defective — ? Total — ?

Note!

reason	(сущ.) причина, довод, резон
--------	------------------------------

3. Learn the new words and phrases.

air draft	сквозняк; воздушная тяга
be covered with	(гл.) быть покрытым чем-либо
crack	(сущ.) трещина, треск
cracking	(сущ.) растрескивание, расщепление
concave	(сущ.) впадина, свод; (прил.) вогнутый, впалый
frost	(сущ.) мороз, иней

happen	(гл.) происходить, случаться
hole	(сущ.) отверстие, дыра
impedance	(сущ.) сопротивление
inclusion	(сущ.) включенность, присоединение, вхождение
insufficient	(прил.) недостаточный, неполный, несоответствующий
lateral	(прил.) продольный
nozzle	(сущ.) насадка, форсунка, носик, наконечник
plug up	(гл.) закупоривать, затыкать, забивать
porosity	(сущ.) пористость
prevent	(гл.) предотвращать
spatter	(сущ.) мелкие брызги раскаленного металла, которые остаются на поверхности; (гл.) брызгать (мелчайшими каплями)
too fast	слишком быстро

4. Fill in the missing letters in the words.

Read and translate them.

- 1) prst
- 2) nzl
- 3) plg
- 4) prvnt
- 5) spsc

**5. Match the words in the columns to make phrases.
Read and translate them.**

plug	voltage
insufficient	bead
weld	cracks
shrinkage	up



Reading

6. Read and translate the text.

There is a great variety of welding defects.

Porosity (in or on the surface of the weld bead) is caused by the following reasons:

- bad wire (rust on the surface),
- insufficient gas shielding due to:
 - inadequate gas flow because of a block in the gas line,
 - defective flow meter,
 - gas regulator is covered with frost,
 - gas valve doesn't work,
 - gas nozzle is plugged up with spatter,
 - gas flow holes are plugged up,
 - air drafts in the welding area.

Shrinkage cracks can happen when:

- welding wire to be welded is dirty or rusty,
- weld bead is too small,
- weld bead is too concave,
- there is too much weld bead penetration.

Lateral cracking is caused by the following reasons:

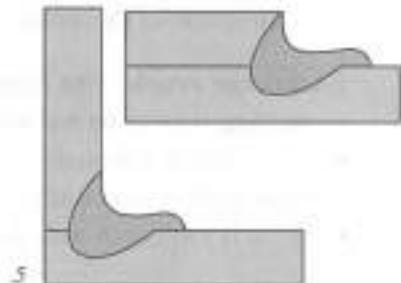
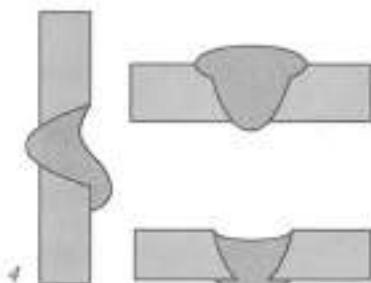
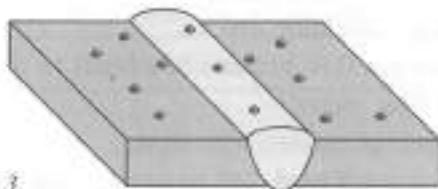
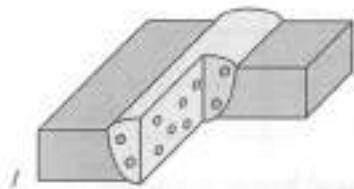
- welding speed is too fast,
- low current,
- high arc voltage.

Inclusions can happen when several runs along the joint are made by flux-coated rods. Slag is not totally cleaned after every run before a new one.

Too much spatter is caused by the following reasons:

- voltage is too high,
- insufficient impedance,
- no gas heater used for CO₂ shielding gas.

7. Look at the pictures and name the defects.



8. Answer the questions.

1. What defects are common?
2. Can you find the defects in welding beads?
3. Have you ever made defects in welding?
4. Can you prevent the defects? How?



Speaking

9. Read and complete the dialogue.

- What's the matter?
- I was making a weld bead. Just look at it!
- Oh, it is really bad. There is rust here.
- Yes, it causes
- Pay attention to it. To prevent this, you should prepare welding areas better
- Ok, I will.

10. In pairs, make up your own dialogue. Act it out.



Test

11. Complete the sentences using the given words and phrases.

cracks, concave, defective, frost, high, holes, inclusions, inadequate, plugged up, porosity, rusted, speed

1. If you use a bad ... wire, it will cause
2. A gas flow can be ... , because it is blocked in the gas line.

3. A gas nozzle can be ... with spatter.
4. If voltage is too ... , it will cause too much spatter.
5. Insufficient gas shielding is due to ... flow meter.
6. When welding ... is too fast, it causes lateral cracking.
7. Gas flow ... can be plugged up.
8. A weld bead is too ... , and it is a defect too.
9. When a gas regulator is covered with ... , the gas flow is insufficient.
10. Low current and high arc voltages make
11. If you don't clean slag after a weld and make a new run, the weld will get



Homework



12. Make a leaflet 'Top List of Defects in Welding'. It should contain:

- the name of a defect,
- its reasons,
- the preventions,
- illustrations.

Lesson 21. HISTORY OF WELDING IN RUSSIA



Tuning in

1. Let's revise.

1. What types of welding beads and joints can you name?
2. What welds are used in joining metals?
3. What welding defects do you know?
4. Present your project work.

A Vocabulary

2. Guess what these words mean.

Author — ? Demonstrate — ? Electricity — ? Farming — ? Medal — ?
Method — ? Patent — ? Phenomenon — ? Physicist — ?

Note!

smelter	(сущ.) металлургический завод, т.е. завод, где плавят металлы, например алюминиевый завод
---------	---

3. Learn the new words and phrases.

ancient	(прил.) древний
armour	(сущ.) доспехи, латы, броня
award	(сущ.) награда; (гл.) награждать
be in demand	быть востребованным

believe	(гл.) верить, доверять
blacksmith	(сущ.) кузнец
deed	(сущ.) поступок, действие, деяние
discover	(гл.) делать открытие, обнаруживать
found	(гл.) основывать, учреждать
founder	(сущ.) основатель
honourable	(прил.) благородный, почтенный, почетный
impact	(сущ.) удар, толчок, воздействие, влияние
introduce	(гл.) знакомить, представлять, внедрять, вводить
make a breakthrough	совершать прорыв (в какой-либо области)
make a contribution	делать вклад
offer a job	предлагать работу
refuse	(гл.) отказываться, отвергать
return	(сущ.) возвращение; (гл.) возвращаться
scientist	(сущ.) ученый
valuable	(прил.) ценный

4. Find the 5 new words in the line. Read and translate them.

honourable scientist breakthrough introduce impact

5. Match the words in the columns to make phrases.

great impact on the	a job
offer	future
invent	profession
honourable	an electric arc
discover	a welding machine



Reading

6. Read and translate the text.

In ancient Russia, blacksmiths were in demand and their work was very valuable. They could make armour, tools, horse shoes, farming tools and decorations. Gold and copper were widely used. It was honourable to be a blacksmith.

In 1802, a Russian physicist Vasily V. Petrov discovered a phenomenon of an electric arc. He studied the use of an electric arc for melting metals. In fact, he made basics for electric arc welding.

In 1882, a Russian scientist Nikolay N. Benardos invented carbon arc welding. It was the first practical arc welding method. As a child, he was interested in blacksmithing. It had a big impact on his future. He studied physics and electricity. He could weld iron as well as lead. Benardos constructed welding machines. He was granted a patent for carbon arc welding in Russia and abroad. He was an author of 200 inventions and projects. Carbon arc welding became popular during the late 1890s and early 1900s.

Nikolay G. Slavyanov was a Russian inventor and a scientist. In 1888, he introduced arc





welding with consumable arc electrodes. It was the second historical arc welding after Benardos's carbon arc welding. This method made a breakthrough in many industries. The inventor demonstrated the first welding machine in the world. He invented a new alloy and called it electrit. The alloy was extremely hard. It is still used nowadays. He could weld unweldable metals — iron and bronze.

In 1893, Slavyanov showed his welding equipment at the World Exhibition in Chicago. American people couldn't believe that it was possible. He was offered a job at the biggest plants in the USA, but he refused and returned home, to Russia.

During his last years, Slavyanov worked a lot over his project of a technological smelter. He had great ideas, but he died because of pneumonia. He worked, inhaling harmful gases and in temperature differences. A special medal after Slavyanov was established by the Academy of Sciences. It is awarded for the best works in the sphere of welding and electric metal work.

The Russian scientists made a great contribution to welding. They were the founders of welding technologies.

7. Find in the text the English equivalents for the following Russian phrases.

- 1) было востребованным
- 2) кузнечное дело было почетным
- 3) открыл явление электрической дуги
- 4) первый практический метод

- 5) имело большое влияние на его будущее
- 6) дуговая сварка плавящимися электродами
- 7) продемонстрировал первый сварочный аппарат
- 8) изобрел новый сплав
- 9) сделал прорыв в сварке
- 10) внесли огромный вклад
- 11) основатели сварочных технологий

8. Answer the questions.

1. Were blacksmiths in demand in ancient Russia?
2. Was their work honourable?
3. What did blacksmiths make at that time?
4. What metals did blacksmiths use in ancient Russia?
5. What did Vasily Petrov discover?
6. What did he make for electric arc welding?
7. What did Nikolay Benardos invent?
8. What did he patent?
9. Who was Nikolay Slavyanov?
10. What did he introduce?
11. What metals could Slavyanov weld?
12. What did the Russian scientist do in Chicago?
13. Could American people believe that welding was possible?

14. What was he offered in America?
15. Did he agree?
16. What ideas and plans did he have?
17. Why did he die?
18. What do you think about him? Was he a patriot?
19. Who founded welding technologies?
20. Are you proud of our great welders?
21. Would you like to get a medal named after Slavyanov?



Speaking

9. Read the dialogue and say where the conversation took place and who took part in it.

- Are you from Russia?
- Yes, I am.
- What is this?
- This is a welding machine.
- Really? Can it weld? What metals can it weld?
- Have a look at it. I can demonstrate it.
- It is impossible! Unbelievable!
- It IS possible.
- Thank you so much. You are a great welder.

10. What would you tell your English-speaking colleague about welding in Russia?



Test

11. Complete the sentences using the given words and phrases.

ancient, armour, blacksmiths, demand, gold and copper, honourable horse, tools, valuable

In ... Russia, blacksmiths were in It was ... to be a blacksmith. ... could make ... for soldiers, ... for farming and ... shoes. Work of blacksmiths was very were widely used metals.

12. Choose the correct variant.

1. Russian scientists *made / did* a great contribution in welding technologies.
2. V. Petrov *invented / discovered* a phenomenon of an electric arc.
3. Benardos *discovered / invented* a welding machine.
4. Slavyanov had a project of a technological *plant / smelter*.
5. Russian engineers made a *breakthrough / breakdown* in welding.



Homework

13. Match the people to their deeds.

- | | |
|--------------|--|
| V. Petrov | introduced arc welding with consumable arc electrodes, invented a new alloy and demonstrated the first welding machine |
| N. Benardos | studied and described the use of an electric arc for melting metals |
| N. Slavyanov | invented carbon arc welding. It was the first practical arc welding method |

Lesson 22. HISTORY OF WELDING IN ENGLISH-SPEAKING COUNTRIES



Tuning in

1. Answer the questions.

1. What do you remember about the history of welding in ancient Russia?
2. What did the Russian scientists start and develop in welding?
3. What contribution did they make in welding?

A Vocabulary

2. Guess what these words mean.

Acetylene — ? Battery — ? Chemist — ? Crane — ? Process — ? Stable — ?

Note!

coated / covered

(прил.) покрытый, с покрытием

3. Learn the new words and expressions.

advance	(сущ.) продвижение, прогресс, улучшение; (гл.) продвигать, наступать, делать успехи
aim	(сущ.) цель, задача; (гл.) направлять, нацеливать
allied	(прил.) смежный, присоединенный, союзный, похожий
appear	(гл.) появляться, показываться
clay	(сущ.) глина (каолин)

extruding	(сущ.) метод опрессовки
heavy-coated electrode	электрод с толстым покрытием
lime	(сущ.) известь
motor shaft	вал тягового двигателя
rear axle	задний мост (ось)
suitable	(прил.) подходящий, соответствующий
weapon	(сущ.) оружие, орудие, вооружение

4. Find the first letter in the words. Read and translate them.

1

2

3

4

5

5. Complete the phrases using the new words.

1) coated ...

2) advance ...

3) allied ...

4) weapon ...

5) motor ...

6) rear ...



Reading

6. Read and translate the text.

In the 19th century, main breakthroughs were made in welding. Scientists and engineers from the UK and the USA took an active part in advancing welding technologies.

Sir Humphry Davy, a famous British chemist and inventor, produced an arc between two carbon electrodes using a battery in 1800. His cousin, Edmund Davy, discovered acetylene in 1836.

In 1890, Charles L.Coffin, an American inventor, got the first US patent for an arc welding process using a metal electrode.

In 1900, Arthur Percy Strohmenger introduced a coated metal electrode in Great Britain. There was a thin coating of clay or lime, but it provided a more stable arc.

In about 1900, a torch suitable for low-pressure acetylene was invented.

World War I made the countries develop weapons production and welding was in high demand. In America and in Europe, many companies appeared to produce welding machines and electrodes.

In 1919, the American Welding Society as a non-profit organization was founded. The aim of the society was to advance welding and allied processes.

In 1920, automatic welding was introduced by the General Electric Company. It was used to build up motor shafts and cranes. It was also used by the automobile industry to produce rear axles.

During the 1920s, various types of welding electrodes were developed.

In 1927, the heavy-coated electrodes were introduced by the A.O.Smith Company in America. The electrodes were made by extruding.

In 1929, the Lincoln Electric Company produced extruded electrode rods.

In 1930, covered electrodes were widely used.

The contribution of British and American inventors in the development of welding was great.

7. Find in the text the English equivalents for the following Russian phrases.

- 1) главные прорывы в технологии сварки
- 2) сварка и смежные процессы
- 3) металлический электрод с покрытием
- 4) покрытие из каолина или извести
- 5) обеспечивать более стабильную дугу
- 6) строить краны
- 7) производить валы тягового двигателя
- 8) производить задние мосты в автомобильной индустрии
- 9) автоматическая сварка
- 10) развивать оружейное производство
- 11) различные типы электродов
- 12) электрод с толстым покрытием
- 13) вклад британских и американских ученых

8. Make up sentences using the given words.

1. in 1836 acetylene discovered Edmund Davy
2. appeared many to produce welding machines companies
3. types electrodes various were of developed



Word Formation

9. Form the new words. Read and translate them.

Example: non (не-, без-) + profit (выгода, прибыль) = non-profit
(не приносящий прибыль)

- 1) non + resident = ...
- 2) non + metallic = ...
- 3) non + consumable = ...

10. Complete the sentences using the words from exercise 9.

1. I can't find the address. The person is a
2. You should be careful with ... parts of the machine.
3. TIG welding is made with a ... electrode.



Test

11. Complete the sentences using the given words and phrases.

acetylene, advance welding, an arc between two carbon electrodes, a coated metal electrode, in America and in Europe, produced, the first US patent, use with low-pressure, was introduced by

1. In 1800, Sir Humphry Davy produced
2. In 1836, Edmund Davy discovered
3. In 1890, Charles L.Coffin got ... for an arc welding process.
4. In 1900, A.P.Strohmenger introduced ... in Great Britain.

5. In about 1900, a torch suitable for ... acetylene was developed.
6. ... , many companies appeared to produce welding machines.
7. In 1919, the American Welding Society was founded to
8. In 1920, automatic welding ... the General Electric Company.
9. In 1929, the Lincoln Electric Company ... extruded electrode rods.



Homework

**12. Match the dates to the names and deeds
of the people / companies in English-speaking countries.
Write down the sentences. Use the text.**

Dates	People / Companies	Deeds
In 1800	Charles L.Coffin	produced an arc between two carbon electrodes using a battery.
In 1836	A.P.Strohmenger	discovered acetylene.
In 1890	the American Welding Society	introduced a coated metal electrode.
In 1900	the General Electric Company	advanced welding and allied processes.
In 1919	the A.O.Smith Company	introduced automatic welding.
In 1920	Edmund Davy	got the first patent for an arc welding process using a metal electrode.
In 1927	the Lincoln Electric Company	produced extruded electrode rods.
In 1929	Sir Humphry Davy	introduced heavy-coated electrodes.

Lesson 23. EXHIBITIONS IN THE WELDING INDUSTRY



Tuning in

1. Answer the questions.

1. Do you like to visit exhibitions?
2. Have you ever been to any exhibitions devoted to welding?
3. Would you like to go there?

A Vocabulary

2. Guess what these words and phrases mean.

Collective — ? International — ? Make a contract — ? Newly-designed products — ?
Personal — ? Round-table discussion — ?

Note!

accessories	(сущ.) вспомогательное оборудование, принадлежности, аксессуары
energetics	(сущ.) энергетика; (прил.) энергетический

3. Learn the new words and phrases.

assess	(гл.) оценивать (технические характеристики), определять (сумму налога, ущерба)
distinction	(сущ.) отличие, различие, распознавание
edge preparation	обработка шва, края

event	(сущ.) событие, мероприятие
feature	(сущ.) характеристика, черта, свойство, признак
get acquainted	познакомиться, присмотреться
latest achievement	последние достижения
opinion	(сущ.) мнение, суждение, точка зрения
reliable	(прил.) надежный
solution of the problem	решение проблемы
supplier	(сущ.) поставщик
trend	(сущ.) тенденция, веяние, тренд
up-to-date	идущий в ногу со временем, новейший, современный

**4. Fill in the missing letters in the words.
Read and translate them.**

- 1) dstnctn
- 2) nrctcs
- 3) rlbl
- 4) sltn
- 5) spplr
- 6) trnd

5. Match the words in the columns to make phrases.

up-to	acquainted
get	-date
reliable	of a problem
solution	achievement
hardening	supplier
latest	coating



Reading

6. Read and translate the leaflet.

Weldex is the largest international exhibition for welding materials, equipment and technologies in Russia (<http://www.weldex.ru/ru-RU>).

Exhibition sections:

- Equipment and materials for welding
- Equipment for cutting
- Equipment and materials for protective and hardening coatings
- Welding joint quality control equipment
- Welding tools and accessories
- Personal and collective protective equipment for welding operations
- Equipment for edge preparation

Weldex is for:

- Engineering
- Welding
- Construction and repair
- Energetics
- Oil and gas industry
- Metallurgy

Manufacturers and suppliers of welding equipment take part in the Exhibition every year. They demonstrate up-to-date reliable welding products.

187 companies from 14 countries worldwide present their products at the Exhibition: ESAB, FANUC Robotics, Kemppi, KUKA Robotics, Lincoln Electric, Messer, voestalpine Bohler Welding, Ryazan State Instrument-Making Enterprise, Losinostrovsk Electrode Plant, RPE Tehnotron, STA IRE-Polus and many others.

Only at Weldex you can:

- Choose welding equipment and materials
- See up-to-date equipment in operation
- Assess technical specifications
- Study the most modern welding technologies
- Make profitable contracts
- Listen to the opinions of experts in the sphere of welding and allied processes
- Get acquainted with trends and the latest achievements in the industry at events of the Business Programme
- Find up-to-date process solutions and newly-designed products for all types of welding and allied processes. You can see up-to-date welding sets, robots, personal protective equipment, ventilation and filtration equipment, welding joint quality control systems.

PROGRAMME OF EVENTS

The first day		
12:00	The Opening Ceremony of the International Specialized Exhibition for Welding Materials, Equipment and Technologies Weldex Organizer: The ITE Group	Hall 1
10:30—17:00	'The Best Welder' and 'The Best Young Welder' Contests Organizers: The ITE Group, ELSVAR	Hall 2
10:00—18:00	Demonstration of art and decoration products made by welding and forging Organizer: The ITE Group	
The second day		
10:00—14:00	The Session of Main Welders of Moscow and the Moscow region with the topic 'The best technologies, equipment, materials for welding, cutting, building-up'	Hall 2

	from Weldex exhibitors for manufacturing facilities in the Moscow region and other regions of Russia' Organizers: The ITE Group, Moscow Inter-Industry Association of Main Welders (MIIAMW), ELSVAR	
10:00—14:00	Round-table discussion 'Features and distinctions of new welding solutions for MIG/MAG, TIG as well as manual and semiautomatic plasma welding and cutting'	
	Round-table discussion 'Quality factors of current welding materials production. Quality coated electrodes, non-consumable carbon and tungsten electrodes, welding fluxes'	
	Round-table discussion 'Health, safety and environment. Means of protection against job hazards at welding, cutting and building-up'	
14:00—17:30	Round-table discussion 'Trends and ways of import substitution in welding production in Russia' Organizers: The ITE Group, RSTWS, ELSVAR	Hall 1
14:00—18:00	Modern technologies of non-destructive testing and welding joint diagnostics Organizer: RONKTD	Hall 2
The third day		
15:30—16:30	Contest winners awarding ceremony: 'The Best Welder', 'The Best Young Welder' and 'The Best Engineer (Scientist) Welder' Organizers: The ITE Group, ELSVAR	Hall 1
187 exhibitors 14 countries 9,251 sq. m total space Welcome to Weldex International Exhibition!		

7. Answer the questions.

1. Why is the exhibition called 'Weldex'?
2. What can you see and learn at Weldex?
3. How many countries take part in the exhibition?

4. What section would you like to visit? Why?
5. Is Weldex popular?
6. What event of the programme would you like to take part in?
7. What would you tell your English-speaking colleagues about Weldex?
8. What section would you recommend them to visit?
9. Would you like to take part in the contest 'The Best Young Welder'?



Speaking

8. Read the dialogue and say where the conversation is taking place.
 - Excuse me, can you help me?
 - Yes, please.
 - I am interested in new MIG / MAG, TIG welding solutions. Where can I take part in the discussion?
 - There is a round table discussion in Hall 2. Go straight ahead. It will start in 10 minutes.
 - Thank you very much.
 - Welcome.

9. In pairs, make up your own dialogue. Act it out.
Use the programme from exercise 6.



Test

10. Complete the sentences using the correct form of the words in capitals.

- | | |
|-------------------------------------|-----------|
| Weldex is for (1) _____ | ENGINEER |
| and (2) _____. | CONSTRUCT |
| You can make (3) _____ contracts. | PROFIT |
| You can assess technical (4) _____. | SPECIFIC |
| You will see the latest (5) _____. | ACHIEVE |

11. Complete the new words to fill in the gaps.

The first letter is given.

1. At the exhibition, you can get a____ with the newest t____ in the industry.
2. You can visit the most interesting d____ and listen to the e____ in welding.
3. You can see u____ equipment in w____, c____ and e____ preparation.
4. You can make profitable e____.
5. At Weldex, you can find r____ p____ and e____ protective equipment.



Homework



12. There are many international exhibitions, for example:

- MLA Expo (<http://www.locksmiths.co.uk/mla-expo/>),
- EMAF (<http://www.emaf.exponor.pt/>),
- AMB (<http://www.messe-stuttgart.de/en/amb/>),
- WIN Eurasia (<http://win-eurasia.com/en>),

- Schweissen & Schneiden (<https://www.schweissen-schneiden.com/joining-cutting-surfacing/>),
- Valve World Expo (<http://www.valveworldexpo.com/>).

Choose one of these exhibitions or any other you like and find out the following information about it:

- the country where it takes place,
- the number of participants,
- the exhibition sections,
- the exhibition items,
- interesting events.

Illustrate your story.

Lesson 24. HAVING A JOB INTERVIEW



Tuning in

1. Answer the questions.

1. Have you ever had a part-time job?
2. Have you ever had a full-time job? Did you like it?
3. What good or bad points are in your job?
4. Where would you like to work?

A Vocabulary

2. Guess what these words and phrases mean.

Welding test — ? Enthusiastic — ? Interview — ? Punctual — ? Reputation — ?
Vacancy — ? Sketch — ?

Note!

bracket	(сущ.) держатель, планка, скоба
department	(сущ.) отдел, цех, дирекция, департамент

3. Learn the new words and phrases.

acknowledgment	(сущ.) подтверждение, признание
annual	(прил.) ежегодный, годичный
applicant	(сущ.) кандидат, претендент, соискатель
ascertain	(гл.) определять, устанавливать, удостоверяться

bollard	(сущ.) металлический или бетонный столб, препятствующий движению автомобилей
CV (curriculum vitae)	краткое описание жизни и профессиональных навыков (в России синоним слова «резюме»)
marital status	семейное положение
multitask mode	режим многозадачности
overtime	(сущ.) сверхурочное время; (прил.) сверхурочный
permanent position	работа на постоянной основе
position applied	вакансия, на которую претендуют
previous	(прил.) предыдущий
read blueprints / drawings	читать чертежи
salary expectations	пожелания относительно размера заработной платы
shift	(сущ.) рабочая смена, рабочий день
temporary contract	временный контракт
turnstile	(сущ.) турникет
working experience	опыт работы

4. Find the 5 new words in the line. Read and translate them.

work overtime night shift salary expectations

5. Match the words in the columns to make phrases.

day	expectations
salary	shift
annual	CV
scnd	blueprints
read	status
marital	payment



Reading

6. Read the job advertisements and say what the employers offer.

**Steel Welder Welding Fabricator 20160702
EDS (Electrical Data Security) Ltd — Birmingham B30
£8—£12 an hour**

Steel welders, welding fabricators required with skills in all welding and fabrication of mild steel; producing gates, barriers, bollards, turnstiles plus various products from sketches and drawings.

Some stainless steel welding would be an advantage but not necessary.

Understanding verbal instructions, sketches or drawings.

Ideally you will be local to our factory and you will be asked to conduct a welding test to ascertain your quality of weld.

Pay Range: Between £8.00 and £12.00 per hour depending on experience (minimum 5 yrs experience).

JOB TYPE: Full-time directly employed

JOB LOCATION: Pershore Road, Kings Norton Birmingham B30 3DR

START DATE: Immediate ASAP (as soon as possible)

CALL: 0121 213 0160

Davisco Foods is currently seeking a Maintenance Mechanic Welder for our Le Sueur Cheese plant in Le Sueur, Minnesota.

Essential functions include the following:

- Perform daily welding requests to repair process equipment, parts, and other welding needs in or out of the facility.
- Ability to fabricate and weld a variety of parts, brackets, trays hangers etc.
- Ability to use all shop tools and equipment associated with the welding trade.
- Manage and maintain necessary supplies and materials used in this job function.
- Maintain a clean and safe work area.

Technical Competencies:

- Ability to pay strong attention to detail and multitask effectively
- Skills in and knowledge of welding
- Ability to weld stainless steel
- Ability to weld with stick welder to make a variety of repairs in horizontal, vertical and overhead
- Ability to read and understand blueprints
- Good problem-solving skills, ability to follow and use root cause analysis

Qualifications:

This is a temporary contract up to the end of August with possibility of permanent position

JOB TYPE: Full-time

SALARY: \$10.00 / hour

Must be FULLY EXPERIENCED welder; 3 years

7. Read the CV and say if this person can get one of the above jobs.

Personal Information

First name / Surname	James Morgan
Age	24
Address	1355 West Highway 10, Anoka, MN 55303
Telephone	+12183954755
Email	j_morgan@com.us
Nationality	American
Marital status	Single
Work experience	3 years
Education and training	Anoka Technical College, Minnesota http://www.anokatech.edu/ future_students/subjects/welding/ index.html
Personal skills and competences	Producing a quality product in timely manner MIG / TIG, MMA welding Enthusiastic, responsible, hard-working, confident PC skills
Additional information	No health problems, I don't smoke, have played football for 5 years

8. Answer the questions.

1. Will James get a job in these companies?
2. What company would you prefer? Why?

9. Complete the sentences using the new words and phrases.

1. If I have a job interview, I am a job
2. If I want to be respected at my work, I have to be
3. To have some extra work means to work
4. If I am not married, I am
5. If I work, I will have
6. Money paid for my work is
7. To work in the day time or night time means to work
8. I am 20, this is my
9. To get a job, I have to pass a welding
10. If I study at college, I will get secondary vocational



Speaking

10. Read the job interview and say who is taking part in the conversation.

- Good afternoon!
- Good afternoon!
- Sit down, please. What's your name, please?
- I am Paul. Paul Smith.
- What position are you applying for?
- Welder.
- How old are you?

- Twenty-three.
- Ok. Where did you study?
- Bevill State Community College. Welding programme.
- Fine. Do you have any working experience?
- Yes, I do. I have worked at EDS (Electrical Data Security) Ltd for three years.
- Great. What kind of welding do you specialize in?
- MIG / MAG, TIG, MMA, laser welding and plasma cutting.
- Can you read blueprints?
- Sure.
- Why do you want to work in our company?
- Your company has a good reputation. Besides, the salary is good.
- What are your payment expectations?
- About 10 or 12 dollars per hour.
- Reasonable. Do you mind working shifts or overtime?
- No, I don't. I am responsible and punctual.
- Are you married?
- Not yet. I am single.
- You can have a welding test right now if you don't mind.
- I am ready.
- Fine. Well, we will get in touch with you in three days. Thank you for coming.
Goodbye.
- Welcome. Goodbye.

- 11. Imagine you are having a job interview.
In pairs, make up your own dialogue. Act it out.**



Test

- 12. Match the questions to the answers.**

What's your name, please?	Ten pounds per hour.
How old are you?	A lot. Steel, iron, aluminium.
What position are you applying for?	Your good reputation.
What did you study?	Twenty-two.
Where did you work?	MIG welder.
How long did you work?	No, I don't.
What kind of welding do you specialize in?	For three years.
What type of metals did you work with?	Sports and travelling.
Why do you want to work in our company?	United Mechanical & Electrical Solutions.
What are your salary expectations?	Canterbury College.
Do you smoke?	TIG / MIG, MMA welding.
What do you do in your free time?	Tim Burton.



Homework

- 13. Write your own CV in English using the material of this lesson. Answer the questions in exercise 12.**

Lesson 25. THE WORLD SKILLS COMPETITION IN WELDING



Tuning in

1. Read the word family. Translate the new words.



2. Answer the questions.

1. Do you take part in competitions? Do you like to compete?
2. Are you competitive? Have you ever taken part in professional competitions?
3. Can you translate the name of the competition?
4. Do you know anything about the WorldSkills contest?

A Vocabulary

3. Guess what these words and phrases mean.

Competition results — ? Global industry — ? Information — ? Initiator — ?
Motivate — ? Socioeconomic transformation — ?

4. Learn the new words and phrases.

competing spirit	соревновательный дух
convince	(гл.) убеждать, уверять

due to similarities	благодаря сходству
exchange	(сущ.) обмен; (гл.) обменивать
far-reaching goals	далекоидущие цели
great	(прил.) великий, большой
inspire	(гл.) вдохновлять, воодушевлять, внушать
need	(сущ.) потребность, нужда; (гл.) нуждаться, иметь потребность
prospective employer	потенциальный, будущий наниматель
provide the opportunity	обеспечивать возможность
reflect	(гл.) отражать; раздумывать, размышлять
skills	(сущ.) умение, мастерство
succeed	(гл.) быть успешным, достигнуть цели
suitable solution	подходящее решение
technological career	техническая профессия
trade	(сущ.) профессия, занятие, ремесло
vocational training	профессиональное образование

**5. Find the 11 new words in the word puzzle.
Read and translate them.**

s	p	i	r	i	t	g
k	r	n	e	e	d	o
i	o	s	t	g	u	a
l	v	p	r	r	e	l
l	i	i	a	e	t	f
x	d	r	d	a	o	a
o	e	e	c	t	l	r

6. Complete the phrases using the new words.

- 1) competing ...
- 2) suitable ...
- 3) prospective ...
- 4) far-reaching ...
- 5) technological ...
- 6) due to ...
- 7) vocational ...



Reading

**7. Read the text and match its paragraphs to the titles.
One title is extra.**

- A. General Information
- B. The History of the WorldSkills Competition
- C. The Idea Proves to Be Successful
- D. Europe Gets in
- E. The Aims of the Competition
 - 1. The WorldSkills Competition is the biggest vocational education and skills excellence event in the world that truly reflects global industry. It is held every two years. The competitors demonstrate technical abilities and skills in 45 trades. They do specific tasks for which they study and / or perform in their workplace. They do it both individually and collectively.
 - 2. One of the main goals of the WorldSkills Competition is to give importance to professional education, as one of the true tools of socioeconomic transformation. The Competition also provides leaders in the industry, government and education with the opportunity to exchange information and best practices in different industries and professional education. New ideas and processes inspire school-aged youth to technical and technological careers and towards a better future.
 - 3. It was 1946, and there was a great need for skilled workers in Spain. Mr José Antonio Elola Olaso, who was General Director of OJE (Spanish Youth Organization), had an insight: it was necessary to convince youth, as well as their parents, teachers and prospective employers, that their future depended on an effective vocational training system. For this challenge, the most suitable solution was to organize a competition. So, young people's competing spirit would be aroused, adults would discuss the competition results and visitors would be able to see a great variety of trades being demonstrated.
 - 4. But the initiators wanted much more than that. As a matter of fact, they had far-reaching goals: to motivate youth to compete, to make them enthusiastic about vocational training and to compare skills and abilities of people from different countries. Due to similarities in language, history and culture, contacts were made with Latin American countries to set up a joint International Competition. At first, these contacts did not succeed, but Portugal showed interest in the project. As a result, in 1953, at Spain's invitation, youth from Germany, Great Britain, France, Morocco and Switzerland took part in it for the first time.



8. Answer the questions.

1. Have you ever taken part in the WorldSkills Competition?
2. Would you like to take part in the Competition?
3. Is it exciting? Is it honourable?
4. What do you have to know to take part in the Competition?
5. What do you have to do in the Competition?

Speaking

9. Read the dialogue and say who is taking part in the conversation and where it is taking place.

- Hello.
- Hi.
- I am Benjamin from Canada. What country are you from?
- I am Alexander from Russia.
- Great. Are you taking part in an international competition for the first time?
- Yes, I am. And you?
- Me too. Exciting, isn't it?
- It is. Have a good luck.
- Same to you. See you later.

10. In pairs, make up your own dialogue. Act it out.

 **Test****11. Complete the sentences using the given words.**

careers, competing spirit, Competition, competitors, exchange, inspire, need, professional, provides, results, suitable, variety of trades, vocational

1. The WorldSkills Competition is the biggest ... education and skills competition for young people.
2. The ... demonstrate technical abilities and skills to do specific tasks.
3. The ... reflects global industry.
4. The Competition also ... the opportunity to ... information and best practices in different industries and ... education.
5. New ideas and processes ... school-aged youth to technical and technological ... and towards a better future.
6. After World War II, there was a great ... for skilled workers.
7. For this challenge, the most ... solution was to organize a competition.
8. Young people's ... is aroused.
9. Adults discuss the Competition
10. Visitors can see a great ... being demonstrated.

**Homework****12. Read the stories.**

The two personal stories show the great interest the competitions aroused at that time.

1. A young Frenchman read in a local newspaper that an International Vocational Training Contest would be held in Madrid. So, he travelled there at his own expenses and managed to join in.

2. A young English textile worker arrived with his father and was allowed to participate in the competition without previous registration. His work was highly praised by the organizers. Later on, Mr F.Hill — his father — became Official Delegate and Honorary Member of the IVTO. At the age of 85, he attended the 30th International Youth Skill Olympics in Birmingham.

Answer the questions.

1. Are these examples inspiring?
2. What do your parents think about it?

READING SECTION

RUSSIA IN WORLD SKILLS

In October 2011, the project 'WorldSkills National Occupations Championship' was approved by Vladimir Putin, the Russian President, and it was the start of the WorldSkills movement in Russia.

On May 17, 2012, a regular General Assembly of WSI was held in South Korea. During this Assembly, Russia was formally accepted as a member of this international organization. In the spring of 2013, the First All-Russian Professional Skills Competition 'WorldSkills Russia 2013, National Championship' took place in Tolyatti. The championship was attended by over three hundred participants aged from 18 to 22 — students of secondary vocational institutions, winners of regional contests.

Following the National Championship, a national team of the Russian Federation was formed. In July 2013, the team took part in the world competition of WorldSkills International in Leipzig (Germany).

In May 2014, WorldSkills Russia 2014, the II National Blue-Collar Occupations Championship, brought together hundreds of participants. It became one of the main stages of preparation of the Russia's national team for the performance at the WorldSkills Competition in 2015.

On December 30, 2014, non-profit partnership the Union 'Agency for Development of Professional Communities and Skilled Workers "WorldSkills Russia"' was registered in the Unified State Register of Legal Entities.

Currently, our country declared its commitment to development and recovery of the secondary vocational education system. In view of the experience of the industrialized countries, where professional training helps them to gain a competitive advantage and develop the economy, our government has taken the major initiative to create a powerful tool for the development of vocational training in Russia — WorldSkills Russia — the Union 'Agency for Development of Professional Communities and Skilled Workers "WorldSkills

"Russia". Pavel Chernykh became the President of the Union "Worldskills Russia". Participants of WorldSkills Russia compete in dozens of disciplines of all kinds covering different trades. For example, the II National Championship in Kazan included 35 skills: rockshaper, tile placer, joiner, carpenter, bricklayer, refrigerationist, furniture maker, plumber, dry construction specialist — plasterer, electrician (electric fitter), web designer, CAD specialist, system administrator, graphic designer, jeweller, video editor, CNC miller, CNC lathe operator, mechatronics engineer, welder, robot technician, electronics technician, medical technology specialist, universal hairdresser, stylist, cookery specialist, candy maker, florist, nurse (social worker), optometrist, fashion designer, auto body repair man, motor mechanist (auto mechatronics specialist), car painter, tractor operator.

A FAMOUS WELDER



Professor Evgeny Oscarovich Paton (1870—1953), the founder of Electric Welding Institute in Kiev, was born in 1870 in Nice, France. He studied at Dresden Technical University and at St Petersburg Institute of Railway Engineers.

In 1929, he organized a welding laboratory and the Electric Welding Committee. Paton was a pioneer in joining and welding technology. To make the process of welding reliable, he researched the mechanics of welded structures and the physics of the electric arc. Paton formulated the main principles of arc welding. He developed welding equipment, tools and techniques. During World War II, Paton supervised the production of equipment and technology for automated welding of special steels for tanks (T-34), bombs and other military hardware. After the war, more than 100 bridges were constructed under his supervision.

This is the first all-welded bridge in the world. The design and construction were made by academic Paton. The place was so beautiful, that he gave up the idea of making a tunnel. He decided to make a bridge for people to enjoy the beauty of the place. The construction began in 1940, but the war stopped the project. During the war, the first part of the bridge was bombed. After the war, the part was restored and the construction was continued. He died a few months before the opening of the bridge. To remember Paton, the bridge was named after the great scientist and welder.

The bridge is one of the largest in Europe. It is 1,543 metres long. 10,688 welds were made to connect 264 blocks. It is extremely strong. 135,000 vehicles drive the bridge per day. For the first time in the world, the main beams were mounted with electric welding instead of rivets. Now this method is widely used around the world.

WELDING GASES

There is a variety of different types of gases that are used in welding. One of the major ways that gases are used is for shielding the area to be welded from gases that come from the atmosphere. The reason the welding area needs to be shielded is because these other gases can change the way the weld looks or make it difficult to use.

Whether a gas is used, the type of gas, and how it is used will be determined by the welding process. Some of the most common gases and their uses are listed here.

Acetylene gas. This is a flammable gas that is colourless, and some people say it smells like garlic. The periodic table designation is C_2H_2 . This gas is the hottest of all hydrocarbon gases because it has a structure that is called the triple bond. When you combine this gas with oxygen, which is how it is often used, the temperature of the flame can get as high as 5,580 degrees Fahrenheit. This gas can be used for small or large projects. It is often called oxyacetylene when combined with oxygen.

Uses: for bracing, welding, cutting and soldering. It is usually stored in pressurized steel cylinders.

Air. Believe it or not, air is considered a gas in a welding situation. Air is found in bottles and is often compressed for the purposes of welding.

Argon. This is a non-toxic, non-flammable and inert gas, which means that it doesn't take part in a chemical reaction when it comes in contact with metal or other material. It is also a colourless gas and it doesn't carry an odour.

Uses: it is basically used for arch welding, the manufacturing of electronics, making steel and heat treating. It is also used to weld aluminium and stainless steel (when combined with oxygen).

Oxygen. It is primarily used with other gases where high heat is necessary to make a weld. It is most often used with acetylene, but it can also be mixed with argon and other types of gases.

Uses: necessary when you want to use a high heat on metal.

Gases are most often used with a torch that has a regulator that can control the amount of gas that is distributed at any given time. The torch itself is attached

to the regulator through hoses and the regulator is attached to the cylinder to hold the gas. Some gases like propane are in cylinders that have a short tube at the end; the torch is connected directly to the cylinder.

There are many safety precautions one should take with gases to cut the risk of being hurt. Some things are common sense, but it is a good idea to mention them anyway. Store the cylinders in a place where they will not be damaged or overheated. If they are large cylinders, make sure they are stored in a way that stops them from falling. If you have extra gas or cylinder oxygen, they should be stored separately.

A GUIDE TO UNDERWATER WELDING

The two main categories of underwater welding techniques are:

- wet underwater welding,
- dry underwater welding (also called hyperbaric welding).

The definition of underwater welding usually refers to the **wet welding technique** where there is no mechanical barrier that separates the welding arc from the water.

In wet underwater welding, shielded metal arc welding is commonly used, employing a waterproof electrode. Other processes that are used include flux-cored arc welding and friction welding. In each of these cases, the welding power supply is connected to the welding equipment through cables and hoses. The process is generally limited to low-carbon equivalent steels, especially at greater depths, because of hydrogen-caused cracking.

For deep water welds and other applications where high strength is necessary, **dry water welding** is most commonly used.

In dry underwater welding, the weld is performed at the prevailing pressure in a chamber filled with a gas mixture sealed around the structure being welded. For this process, gas tungsten arc welding is often used, and the resulting welds are generally of high integrity.

In general, assuring the integrity of underwater welds can be difficult, especially wet underwater welds, because defects are difficult to detect. For the structures being welded by wet underwater welding, inspection following welding may be more difficult than for welds deposited in air.

The applications of underwater welding are diverse — it is often used to repair and construct ships, offshore platforms and pipelines. Steel is the most common material welded. In terms of underwater cutting, oxygen-arc cutting with exothermic electrodes and steel tubular electrodes is also used.

An underwater welder must have a commercial diver certification and must be a certified welder. Due to the danger and demands on the body, welders or cutters often work 1 month on and 3 months off.

A GUIDE TO ROBOTIC WELDING

Robotic, or robot welding is the use of mechanized programmable tools (robot) which completely automate a welding process by both performing the welding and handling the part. The process is ideal for situations where a large number of welds are repeated and need to be performed quickly. Processes like metal arc welding, while often automated, are not necessarily equivalent to robotic welding, since a human operator sometimes prepares the materials to be welded.

The robots are utilized in controlled environments such as an automotive assembly plant. Robots are continually monitored by human welding professionals to verify weld integrity and to adjust the equipment as necessary. The auto industry has been using MIG robots for over 25 years, utilizing over 60,000 robots.

Robot welding is a relatively new application of robotics. The use of robot welding did not take off until the 1980s, when the automotive industry began using robots extensively for spot welding. Since then, both the number of robots used in industry and the number of their applications has grown greatly. Arc welding has begun growing quickly and commands about 20% of industrial robot applications.

Growth in robotic welding is primarily limited by the high equipment costs. The resulting necessity of using it only in high production applications. The cost of each robotic cell is approximately 60,000—75,000 US dollars for low-end systems. Mid-range systems cost 75,000—150,000 US dollars while high-end systems cost 150,000 US dollars. As a rule, a work cell will cost 3x to 10x the price of the robot.

Advantages. Why robotic welding? The most prominent advantages of automated welding are precision and productivity. Robot welding improves repeatability. Once programmed correctly, robots will give precisely the same welds every time on workpieces of the same dimensions and specificities.

Automating the torch motions decreases the error potential, which results in decreased scrap and rework. With robot welding, you can also get an integrated output. Not only does a robot work faster, the fact that a fully equipped and optimized robot cell can run for 24 hours a day, 365 days a year without downtime makes it more efficient than a manual weld cell.

Another benefit of automated welding is the reduced labour costs. Robotic welding also reduces risks by moving the human welder / operator away from hazardous fumes and molten metal close to the welding arc.

Robotic welding summary of advantages:

- improved quality,
- reduced levels of overwelding,
- less post weld cleanup,
- increased operator productivity,
- higher deposition rate, improved wire deposition efficiency,
- faster torch travel speed,
- improved weld appearance,
- reduced operator skill,
- reduced weld time, faster than humans,
- lower total welding cost / foot,
- lower rework,
- consistent weld penetration,
- improved flexibility with reprogramming,
- amortization of equipment costs over multiple shifts,
- accident reduction,
- can be used in environments that are hazardous to humans,
- fewer work stoppages.

Limitations. One problem when welding with robots is that the cables used for current and air etc tend to limit the capacity of movement of the robot wrist. A solution to this problem is the swivel, which permits passage of compressed air, cooling water, electric current and signals within a single rotating unit. The swivel unit also enables off-line programming as all cables and hoses can be routed along defined paths of the robot arm.

Other limitations of robotic welding:

- complex end-user programing, not user-friendly, only for specialists,
- limited application programming interfaces (APIs), making a simple change complicated,
- the human machine interface (HMI) not really working. Systems require customization and training. Difficult to customize robotic welding systems,
- connectivity challenges, lack of inter-connectable standards,
- replaces human labour,
- technology becomes out of date.

WELDING IN SPACE

Welding in space is different from welding on Earth. The Russians were the first to explore welding in zero gravity and/or in a vacuum. As reported by the *Sputnik Morning Herald*, the Russian cosmonaut Valery Kubasov was the first person to attempt vacuum welding in space in the 1960s, as part of the preparation to build the first world space station 'Salyut 1'.

Kubasov's experiments were a turning point for zero gravity operations. The need for effective welding techniques in weightless conditions became clear in the 1990s, when the International Space Station was launched. On Soyuz flight in 1969, Kubasov used a cylinder inside the unpressurized orbital module called the 'Vulkan furnace', which he could control remotely. He tried out different welding devices via an electron gun:

- **Electron beam welding.** This process sends electrons at a very high velocity to the specific areas of the contact surfaces of the metals for joining.
- **Low-pressure plasma arc welding.** The plasma arc process is constrained. It requires a water-cooled spray nozzle to restrict the arc to get the properties necessary for welding.
- **Consumable electrode welding.** This is another form of arc welding that uses a consumable electrode.

It was extremely risky. Fortunately, the cosmonauts were lucky and no lives were lost in the welding experiments.

Challenges of welding in space. Much of NASA's maintenance and work happens on the ground and not in space. NASA's technology experts wanted to avoid any need for in-space welding. For example, they constructed space vehicles with materials that can withstand space travel, made of materials such as ceramic and aluminium.

The reason for this approach is that in-space welding can be extremely challenging. The structure, composition and quality of a weld depends on the distribution of temperature in the weld pool and the distribution of molten materials when the weld is formed, which is difficult to control in space. Welding techniques that rely on cautiously balanced shielding gases would also be tough to manage since gases behave differently in zero gravity and airless environments.

Another problem is securing welding power sources. Portable generators require surrounding air for cooling which is not possible in space. Since aluminum

the main metal used in space construction, TIG welding would be the go-to technique for repairing parts of a spacecraft; but the dexterity and precision required for TIG welding would be difficult to accomplish in zero gravity. Electron beam welding demands a vacuum rather than a shielding gas to protect the weld, which cannot be easily done inside the spacecraft.

NASA's innovative welding techniques. Nowadays NASA employs a number of innovative welding techniques that enable spacecraft to withstand the rigors of space travel while also allowing for some repairs to be conducted in space:

- **Friction stir welding.** Friction stir welding is a technique that uses frictional heating with forging pressure to produce high-strength bonds essentially free of defects. A rotating pin tool softens, stirs and forges a bond between two metal plates to form a welded joint. NASA has developed a brand-new design for a friction stir welding tool.
- **Ultrasonic stir welding.** Another NASA-developed weld process, ultrasonic stir welding, uses a stirring rod to stir the plasticized abutting surfaces of two metallic alloy pieces to form the weld joint. Heat is generated by an induction coil. The ultrasonic energy reduces unwanted forces, increases travel rates and lessens wear on the stirring rod.
- **Handheld laser.** For small welding jobs, especially in tight spaces, NASA developed a handheld laser. It's useful due to its precision, ability and manoeuvrability. This tool was originally developed to repair parts of the shuttle engine, but has since been licensed by NASA to be used in many other industrial processes.

The challenges presented by the concept of welding in space and the development of the tools needed to accomplish this demanding yet necessary task have in fact greatly stimulated the advancement of welding technology.

UNBELIEVABLE TRAVELLING OPPORTUNITIES

Did you know that welding is done everywhere ranging from the bottom of the ocean to outer space and everywhere in between? As a welder, there is no doubt that you will have the opportunity to travel! Travelling jobs typically pay the most, and there is no shortage of openings. Welders who travel for a living are known as 'Road Warriors'. The road warrior lifestyle is a culture and a way of life for many people. It is a small community of welders and craft professionals that literally live on the road, eat out every night and get paid very well to see the world. Some examples of travelling jobs in welding are:

Industrial shutdowns. Welders who work on industrial shutdowns travel from place to place helping the industries that manufacture the products we buy keep their plants operating trouble-free. Industrial shutdowns typically last from a few days to a few months. For most people doing this type of work, the traveling is done within about a 1,000 mile radius of their home. Welders who work shutdowns typically spend six months out of the year on the road and the other six months taking time off. Not a bad deal, is it?

Shipbuilding and repair. The shipbuilding industry literally has communities built for welders to live because of their need for skilled welders. Shipyards are always hiring welders known as 'independent contractors' to fill the job openings they have when fulfilling large contracts. The types of ships you can help build range from specialty research vessels to aircraft carriers. People who work in shipyards typically travel to the ports where the work is to be done. Shipyard jobs can last a few weeks to a few years depending on how many ships need to be built. The travel in this industry is worldwide. Some welders that specialize in ship construction and repair literally travel the globe yearly. One week you may be in the United States and the next in Japan. Working in the shipbuilding industry you never know where you will be a month from now.

Military support. The military always needs welders to support troops. Military support jobs are typically run by contracting companies that specialize in building infrastructure and repairing military equipment. Some of the types of work that is done are building pipelines, repairing tanks and outfitting military vehicles. Welders who do this type of work can find themselves working as close as their home town and in different cities.

On-board ship maintenance and repair. This type of work requires the welder to live on the ship while it travels the world. Ships always require welders to keep replacing pipes and doing repairs while the ship is out at sea. Working on

a cruise ship means you can literally be in a new country every week. Welders who work on cruise ships not only get paid well but receive a free room and board, chef-prepared meals, access to all of the amenities and a lifestyle that most people only get to experience once in a lifetime, if at all.

Pipeline installation. Pipeline welders travel wherever there are pipelines being installed or repaired. Pipeline welders travel as long as the project requires it. In some cases, the companies will fly the welder to and from their country for holidays and vacations.

Motor sports. We have all seen many motor sports on TV, but did you know that the racing teams hire welders to travel with the pit crews? Welding is a very important technology for any motor sport. Racing teams literally build their cars from the ground up, and there is a lot of welding. Welders get to travel wherever the racing team takes them. It is an exciting career that many people would love be a part of.

SKILLED WELDERS ARE ALWAYS IN HIGH DEMAND

Welding is one of the few career choices that is in high demand at all times. Since welders are needed in almost every industry, it gives them the flexibility to switch industries without changing careers. Let's face the facts: most career choices have ups and downs. Welding, on the one hand, has endless opportunities that keep fueling the demand. When it comes to welding, the salaries are a lot. It all depends on how skilled you are and how far you are willing to travel. Local jobs typically don't pay much or require a lot of skill. On the other hand, if a student learns to weld pipes and is willing to travel, then the salaries are almost too good to be true.

As a welder, your career is what you make of it. You can earn as little as \$20 a year or you can take your career seriously and shoot for the top. Welding is a career choice that rewards those who want to be the best and are willing to travel the world to earn top dollar. Welders have always been in demand. It doesn't matter what the economy does as long as there is an industry that is thriving. As a welder, you can change industries in a moment's notice without changing careers. In recent years, there has been a recession that hit many careers hard, but welders simply shifted to working in the shipbuilding industry.

A lot of money is spent on developing alternative energy sources. Welders play a major part of these industries. It does not matter if it is building bridges, nuclear power plants, windmills or drilling for oil. Welders are going to be needed as long as the world needs energy, infrastructure and defence products. The world's economy cannot survive without the technology of welding. The future outlook for welders just keeps looking better while other career choices seem to be fading away.

FUTURE WELDING TRENDS

Welding operations must be more completely integrated into agile manufacturing processes and process control schemes. Welding will become increasingly automated as it is integrated into the entire manufacturing design and coordinated with improved information systems.

Future products requiring welded joints will be composed of designed-to-be-weldable materials, such as high-strength steels. They are smart materials containing embedded computer chips to monitor the weldment's lifecycle performance. Such materials could create new opportunities for using welding as a joining technique in the coming decades.

In the future, the modelling of welding will be a part of the new emphasis on integrating welding across the entire manufacturing cycle.

Welding and materials engineers will develop new materials and adapt existing materials, which are specifically designed to be welded into world-class fabricated products. New concepts in this area include the development of materials that will reduce energy consumption.

ПРИЛОЖЕНИЕ / APPENDIX

RULES OF WORLD SKILLS / ПРАВИЛА WORLD SKILLS

A Competitor of the WorldSkills Competition must not be older than 22 years in the year of the Competition.	Участник конкурса WorldSkills не должен быть старше 22 лет в год проведения конкурса.
A Competitor may compete in only one WorldSkills Competition.	Допускается участие только в одном конкурсе WorldSkills.
A Competitor gets <ul style="list-style-type: none">• the access to the Competitor Centre on the website www.worldskills.org/competitorcentre,• Technical Description and Infrastructure List.	Конкурсант получает: <ul style="list-style-type: none">• доступ к материалам на сайте;• Техническое описание и Инфраструктурный лист.

Техническое описание включает в себя перечень базовых навыков и знаний, обязательных для компетенции (профессии); определяет название, характеристики компетенции и объем работ; регламентирует разработку, выбор, выверку, внесение изменений (при необходимости) и обнародование конкурсного задания, проведение конкурса, отраслевые требования техники безопасности.

Инфраструктурный лист — это список материалов и оборудования, которое предоставляется Оргкомитетом для проведения конкурса.

BEFORE THE COMPETITION / ПЕРЕД КОНКУРСОМ

Обратите внимание на понятия, используемые в конкурсе:

Competition Rules	Правила проведения конкурса
Code of Ethics and Conduct	Кодекс этики и стандарты профессионального поведения
Health, Safety, and Environment documentation	документация по вопросам охраны труда, техники безопасности и охраны окружающей среды
Test Projects circulated before the Competition (e.g. three months before)	конкурсные задания, опубликованные за 3 месяца до проведения конкурса
Competition timetable	расписание соревнований
Briefing on any additional tools and / or any equipment or material(s)	инструктаж по любым дополнительным инструментам и / или оборудованию и материалам
culture, customs and laws of the Host country / region	материалы с описанием культуры, обычаяев и законов страны (региона), проводящей конкурс

Competition Rules	Правила проведения конкурса
Before the Competition starts, Competitors have a minimum of five hours and a maximum of eight hours in which to prepare their workplaces, and to check and prepare tools and materials.	До начала конкурса конкурсантам предоставляется от 5 до 8 часов на подготовку рабочих мест, а также на проверку и подготовку инструментов и материалов.
Competitors have a right to ask questions. Where processes are especially difficult, a subject matter instructor shall be able to demonstrate the process(es) and Competitors shall have a chance to practise.	Конкурсанты имеют право задавать вопросы. Если процесс очень сложный, инструктор продемонстрирует его, и конкурсанты смогут попрактиковаться.
Competitors must have their passports or ID cards to validate identities and dates of birth.	Конкурсанты должны иметь при себе паспорт для установления личности и даты рождения.

DURING THE COMPETITION / ВО ВРЕМЯ КОНКУРСА

Competition Rules	Правила проведения конкурса
The Competitor must wait for the Chief Expert to give orders to start and to finish work.	Конкурсант обязан дождаться указаний главного эксперта о начале и завершении работы.
No contact may be made with the compatriot Expert during competition time.	Контакты со своим наставником во время выполнения заданий запрещены.
Competitors accused of dishonest conduct, or who refuse to follow regulations and / or directions, or who behave in a manner prejudicial to the proper conduct of the Competition will be subject to the Issue and Dispute Resolution procedures.	Конкурсанты, обвиняемые в нечестном поведении или отказывающиеся соблюдать приказы, а также те, чье поведение мешает проведению конкурса, подпадают под действие Регламента о решении вопросов споров.
Failure by a Competitor to comply with safety directions or instructions may incur a loss of marks in respect of inadequate safety. Continuous unsafe practice may result in Competitors being temporarily or permanently removed from the Competition.	Несоблюдение конкурсантами и правил техники безопасности ведет к потере баллов. Постоянное нарушение норм безопасности может привести к временному или постоянному отстранению от участия в конкурсе.

AFTER THE COMPETITION / ПОСЛЕ КОНКУРСА

Competition Rules	Правила проведения конкурса
The Chief Expert shall give instructions in respect of packing of tools and equipment. The workshop, including materials, tools and equipment, must be left neat and tidy.	Главный эксперт отдает указания об упаковке инструментов и оборудования. Место соревнований, включая материалы, инструменты и оборудование, необходимо оставить чистым.
When the Competition is over, Competitors shall be given one hour to exchange views and experiences with other Competitors and Experts.	В конце каждого дня соревнований конкурсанты получают 1 час на обмен мнениями и опытом с другими конкурсантами и экспертами.
Competitors have the right to expect fairness, honesty and transparency during the Competition.	Конкурсанты имеют право на соблюдение принципов честности, справедливости и информационной открытости в ходе конкурса.

ASSESSMENT OF A COMPETITOR'S PERFORMANCE / ОЦЕНКА ВЫСТУПЛЕНИЯ КОНКУРСАНТА

Обратите внимание на понятия, используемые в конкурсе:

assess	оценивать; оценивание
a Test Project	Конкурсное задание
score	начисление баллов, счет
point	балл
performance	работа участника на конкурсе
assessment criteria	критерии оценки работы участников (работа оценивается в соответствии с укрупненным критериями, которые указаны в Техническом описании компетенции)
subcriteria	субкритерии (каждый критерий разбивается на один или более вспомогательных критериев – субкритериев)
aspect of subcriteria	аспект субкритериев (каждый из субкритериев разбивается на аспекты, по которым оцениваются работы конкурса и выставляются баллы)

Competition Rules	Правила проведения конкурса
The performance of each Competitor is assessed by Subjective and Objective Assessment.	Работа каждого конкурсанта оценивается по субъективным и объективным критериям.
Subjective Assessment. Five Experts assess each aspect of subcriterion attempted. Each Expert awards a score between 1 and 10 to be displayed on flashcards: <ul style="list-style-type: none"> • 1—4: performance below industry standard to a varying extent, 	Оценка по субъективным критериям. Пять экспертов оценивают каждый аспект субкритерия. Каждый эксперт начисляет от 1 до 10 баллов и выставляет свою оценку на табличке <ul style="list-style-type: none"> • 1—4: работа выполнена не в установленных стандартов

Competition Rules	Правила проведения конкурса
<ul style="list-style-type: none"> • 5—8: performance at and above industry standard to a varying extent, • 9—10: excellent or outstanding performance relative to industry's expectations. <p>Where a Competitor has not attempted a particular aspect of a subcriterion, the score awarded by the Experts shall be zero. This will be entered into the CIS by clicking a 'Non-attempt' check box.</p>	<ul style="list-style-type: none"> • 5—8: работа соответствует техническим стандартам; • 9—10: работа выполнена отлично и превосходит стандарты. <p>Если конкурсант не выполнил какой-либо аспект субкритерия, то получает от экспертов ноль баллов. Такой результат вносят в информационную систему конкурса (CIS) с отметкой «Попытка отсутствует» (Non-attempt).</p>

КОММУНИКАЦИИ НА КОНКУРСЕ

WorldSkills — международный конкурс, поэтому его рабочий язык — английский. Поскольку вам предстоит общаться с носителями этого языка рассмотрим на примерах разные ситуации общения.

ПРИВЕТСТВИЕ / ПРОЩАНИЕ

Для приветствий используйте:

Hello.	Здравствуйте.
Hi.	Привет (неформальное приветствие).

Формы приветствия исходя из времени суток:

00:00—12:00 Good morning.	Доброе утро.
12:00—18:00 Good afternoon.	Добрый день.
18:00—00:00 Good evening.	Добрый вечер.

Это пожелания, а не приветствий:

Have a nice day.	Хорошего дня.
Good night.	Доброй ночи.

Для прощания используйте выражения:

See you.	Увидимся.
See you soon.	До скорой встречи.
Goodbye.	До свидания.

Очень важна самопрезентация. Когда представляетесь, говорите четко и уверенно.

Let me introduce myself.	Позвольте представиться (в официальной обстановке).
My name is... and my surname is...	Меня зовут... Моя фамилия...
I am from..., Russia.	Я из... (название города), Россия.
I am studying welding at...	Я изучаю сварочное дело в... (название колледжа).
In the future, I am going to be a welder.	В будущем я собираюсь стать сварщиком.

ЗНАКОМСТВО

Помните, что молодых людей представляют старшим. При разговоре общийтесь на расстоянии вытянутой руки. Не принято подходить слишком близко.

Если хотите, чтобы вас познакомили с кем-либо, используйте выражения:

Introduce me to...	Представьте меня...
Nice to meet you.	Приятно познакомиться.
Nice to meet you too.	Взаимно.

Если вы встретили уже знакомого человека:

Nice to see you.	Рад тебя видеть.
How are you?	Как дела?

На этот вопрос обычно отвечают кратко:

Fine, thanks.	Прекрасно, спасибо.
Not bad, thank you.	Неплохо, спасибо.
So-so.	Не очень хорошо.

Принято интересоваться в ответ:

And you?	А у вас (тебя)?
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Начать разговор можно так:

Do you speak English?	Вы говорите по-английски?
Yes, I do. I speak English a bit.	Да, я немного говорю по-английски.
Do you understand me?	Вы понимаете меня?
Is it your first international competition?	Это ваше первое международное соревнование?
Yes, it is. / No, it isn't.	Да. / Нет.
Have you been to... before?	Вы бывали здесь раньше?
I am here for the first time.	Я здесь впервые.
Say it again, please.	Пожалуйста, повторите.
What's the English for...?	Как сказать по-английски...?
Have we met before?	Мы встречались раньше?
Yes, it seems so.	Кажется, да.
No, I don't think so.	Нет, я так не думаю.

А закончить так:

It was nice to meet you.	Приятно было познакомиться.
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Если нужно узнать, где находится...

room	комнаты, кабинет
workshop	мастерская
assembly hall	актовый зал
conference room	конференц-зал

entrance	вход
lobby	вестибюль, фойе, холл
exit	выход
café / canteen / cafeteria	кафе / столовая
toilet / lavatory / WC	туалет

...задаем вопрос:

Excuse me, where is...?	Извините, где находится...?
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Внимательно слушаем объяснения:

It is on the first / second / third floor.	На первом / втором / третьем этаже.
Go straight.	Идите прямо.
Turn left / right.	Поверните налево / направо.
It is opposite...	Это напротив...
It is next to...	Это рядом с...
It is at the end of the corridor.	Это в конце коридора.
It is round the corner.	Это за углом.

Если нужно, чтобы повторили:

Repeat it, please.	Повторите, пожалуйста.
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Заметьте, слово **please** используется в просьбах.

Выражаем благодарность:

Thank you.	Спасибо.
Thank you so much.	Большое спасибо.

Отвечаляем на благодарность:

Welcome.	Пожалуйста.
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Заметьте, слово **welcome** используется в ответах на благодарность.

Уточняем вопрос / информацию:

Excuse me, can you say it once again?	Извините, можно повторить?
Shall I do it?	Я должен это сделать?
Can I do it?	Я могу это сделать?
Am I right?	Я прав? Я правильно понял?
Am I on time?	Я вовремя?
Slow down, please.	Помедленнее, пожалуйста.
Louder, please.	Погромче, пожалуйста.

Выражаем свое мнение, согласие или несогласие:

I think...	Я думаю...
In my opinion...	По моему мнению...
I agree.	Согласен.
I disagree.	Не согласен.
I agree to some extent.	Согласен в некоторой степени.

Обмениваемся контактной информацией:

I am from...	Я из...
My email is...	Мой электронный адрес...
My Skype address is...	Мой скайп...
My phone number is...	Мой номер телефона...
Add me on Facebook.	Добавь меня на «Фейсбуке».
Text me.	Пошли мне СМС.
Write me.	Напиши мне.
Call me.	Позвони мне.
I will, I promise.	Да, обещаю.

Задаем вопросы:

What is your name?	Как тебя зовут?
Where are you from?	Откуда ты?
Where do you live?	Где ты живешь?
Can I have your phone number?	Можно попросить твой номер телефона?
Can I have your email address? — This is my email address.	Можно попросить твой электронный адрес? — Вот мой электронный адрес.

Когда нездоровится:

pharmacy / chemist's shop	аптека
hospital / ambulance	больница / скорая помощь
first aid post	малпункт
medication	лекарства
I am not feeling well.	Я плохо себя чувствую.
I have a (high) temperature.	У меня (высокая) температура.
I have a headache.	У меня болит голова.
I have a stomachache.	У меня болит живот.
I have a toothache.	У меня болит зуб.

Предписания врача:

Take 2 pills a day before / during / after your meals.	Принимайте 2 таблетки в день перед / во время / после приема пищи.
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Если нужна помощь:

Can you help me?	Вы можете мне помочь?
Excuse me, I need your help.	Извините, мне нужна ваша помощь.

Благодарим за помощь и предлагаем помочь:

Thank you for your help.	Спасибо за помощь.
Can I help you?	Могу я вам помочь?

Названия приемов пищи и связанные с ними выражения:

breakfast	завтрак
lunch	обед
brunch	поздний завтрак
dinner	обед, ужин
coffee break	перерыв на чашку кофе
I am hungry.	Я голоден.
I am thirsty.	Я хочу пить.
Can I have a cup of tea / coffee?	Можно чашку чая / кофе?
Sugar, please.	Сахар, пожалуйста.
Milk, please.	Молоко, пожалуйста.

Вежливо отказываемся:

No, thank you.	Нет, спасибо.
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Обшаемся с соседом по столу:

still / sparkling water	вода без газа / газированная вода
juice	сок
bread	хлеб
spoon	ложка
fork	вилка
knife	нож
Would you like some tea / coffee?	Хотите чаю / кофе?

Can you pass me a napkin?	Передайте мне салфетку, пожалуйста.
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Вручаем подарки на память:

This is my present for you.	Это мой подарок для вас.
It is a souvenir from Russia.	Это сувенир из России.
I hope you will like it.	Надеюсь, вам понравится.

Принимаем подарки:

Thank you.	Спасибо.
Thanks a lot.	Большое спасибо.
It is nice of you.	Мило с вашей стороны.
I am deeply touched.	Я глубоко тронут.

Вежливые просьбы:

May I come in?	Можно войти?
May I go out?	Можно выйти?
Can I sit here?	Можно здесь сесть?
Can I open the window?	Можно открыть окно?
Can I close the window?	Можно закрыть окно?
Can I answer the phone?	Можно я отвечу на звонок?
Will you be so kind to explain it?	Будьте добры, объясните, пожалуйста.
Let me think.	Дайте мне подумать.
Please let me go.	Пожалуйста, позвольте уйти.
Let me know.	Дайте мне знать.

Возможные ответы:

Yes, please.	Да, пожалуйста.
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Ok, no problem.	Хорошо, без проблем.
Sorry, no.	Извините, нет.

Выражаем одобрение / неодобрение:

Well done.	Молодец!
Fine.	Хорошо.
Great.	Отлично.
I can't say I like it.	Не могу сказать, что это мне нравится.

Поздравляем и принимаем поздравления:

Congratulations!	Поздравляю!
Thank you.	Благодарю.

ВРЕМЯ

Понятие времени очень важно для участия в конкурсе. Чтобы быть в курсе всех происходящих событий, важно внимательно изучить расписание соревнований.

Названия дней недели:

Sunday	Sun	воскресенье
Monday	Mon	понедельник
Tuesday	Tue, Tues	вторник
Wednesday	Wed, Wedn	среда
Thursday	Thu, Thurs	четверг
Friday	Fri	пятница
Saturday	Sat	суббота
weekend		выходные

С названиями дней недели используется предлог **on**:

on Monday	в понедельник
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Но:

at the weekend	в выходные
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С числами и названиями месяцев используется предлог **on**:

on the first of May	первого мая
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Составляющие времени:

second	секунда
minute	минута
hour	час

Но:

7 o'clock in the morning	7 часов утра
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Когда говорим о точном времени, используем предлог **at**:

at 7 o'clock	в 7 часов
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Если речь идет о продолжительном периоде:

in the morning	утром
in the afternoon	днем
in the evening	вечером
tonight	сегодня вечером
at night	ночью

Время обозначают следующим образом:

am	до полудня
pm	после полудня
6 am	6:00 (6 часов утра)
6 pm	18:00 (6 часов вечера)
6:15 am	6:15 утра
8:45 pm	20:45
at 9:20 am	в 9:20 утра
half an hour	половина часа

Выражения со словом time:

additional time	дополнительное время
overtime	сверхурочное время, дополнительное время
Take your time.	Не торопись.
Time is over.	Время закончилось.
Time is money.	Время — деньги.
Time is flying.	Время летит.
I am on time.	Я вовремя (как договаривались).
Sorry I'm late.	Извините, я опоздал.
Don't be late.	Не опаздывайте.

ТАЙМ-МЕНЕДЖМЕНТ ПРИ ВЫПОЛНЕНИИ КОНКУРСНЫХ ЗАДАНИЙ

При выполнении каждого задания необходимо уложиться в отведенное на него время.

Обратите внимание на слова и выражения, используемые в конкурсе:

during	в течение
duration	длительность, продолжительность
Start!	Начинаем!
Finish!	Заканчиваем!
... minutes are left.	Осталось ... минут.
You have three hours to complete the project.	У вас три часа на выполнение задания.
The Competitor must wait for the Chief Expert to give orders to start and to finish work.	Конкурсант обязан дождаться указания главного эксперта о начале и завершении работы.
Work efficiently within a time limit set.	Работайте эффективно в течение отведенного времени.
Test Project takes between 15 and 22 hours working time, within a period not more than four days.	На выполнение Конкурсного задания участник тратит от 15 до 22 часов рабочего времени в течение четырехдневного периода.

Если по независящим от конкурсанта причинам ему пришлось прервать выполнение Конкурсного задания (вынужденная остановка), он должен немедленно сообщить об этом главному эксперту или эксперту с особыми полномочиями, отвечающему за контроль времени. При этом фиксируют время начала и окончания остановки. После подтверждения главного эксперта конкурсант имеет право получить дополнительное время, равное времени вынужденной остановки.

ОРГАНИЗАЦИЯ РАБОТЫ

ОБЩИЕ ПОЛОЖЕНИЯ

The Competitor needs to know and understand:

- the interpretation of welding / engineering drawings and weld symbols,
- correct alignment of process with material being used,
- the classification and specific uses of welding consumables including:
 - colour coding of gas cylinders,
 - coding and designation of welding rods,
 - diameters and specific use of welding wire,
- choice and preparation of welding electrodes,
- forms of edge preparation process available,
- how surface contamination can influence the finished weld characteristics,
- the correct machine settings to be aligned to:
 - welding polarity,
 - welding position,
 - material,
 - material thickness,
 - filler material and feed speed,
- any fine adjustments needed to machine hardware, TIG

Конкурсант должен знать и понимать:

- чертежи, спецификации и условные обозначения в сварке;
- правильную технологию работы с материалами;
- классификацию и правила использования расходных материалов, в том числе:
 - цветовую маркировку газовых цилиндров;
 - маркировку и обозначения присадочных прутков;
 - диаметры и особенность использования сварной проволоки;
- правила выбора и подготовки сварочных электродов;
- формы подготовки кромки;
- влияние загрязнения поверхности на окончательный сварной шов и его характеристики;
- правила установки оборудования в соответствии:
 - с полярностью сварки;
 - положением при сварке;
 - материалом;
 - толщиной материала;
 - сварочными присадками и скоростью подачи прополок
- все тонкости настройки машинного оборудования, работы

<p>electrode shape, wire type and diameter etc,</p> <ul style="list-style-type: none"> • the characteristics and properties of filler materials, • welding parameters / variables for specific tasks, • effects of changes in welding variables / parameters of completed weld. 	<p>с вольфрамовыми электродами, проволоками разных типов и диаметра и др.;</p> <ul style="list-style-type: none"> • характеристики и свойства присадочных материалов; • параметры сварки для разных типов заданий; • влияние изменений сварочных параметров на конечный вид работы.
<p>The Competitor shall be able to:</p> <ul style="list-style-type: none"> • prepare material edges as per drawing specification, • select welding consumables by use, size, positional characteristic and material being welded, • remove surface contamination prior to welding, • select correct filler material and size to suit materials being welded, • adjust welding equipment with consideration to welding parameters / variables, • set up welding equipment to manufacturer's specification including (but not limited to): <ul style="list-style-type: none"> – welding polarity, – welding amperage, – welding voltage, – wire feed speed, – travel speed, – travel / electrode angles, – mode of metal transfer, • prepare material edges in line with the specification and drawing. 	<p>Конкурсант должен уметь:</p> <ul style="list-style-type: none"> • подготавливать кромки материала в соответствии со спецификацией чертежа; • выбирать присадочные материалы исходя из размеров, характеристик и материала для сварки; • очищать поверхность материала от загрязнений перед сваркой; • выбирать нужный присадочный материал и размер исходя из материалов для сварки; • регулировать сварочное оборудование, учитывая параметры / переменные сварки; • устанавливать параметры сварки в соответствии с условиями производителя, в том числе: <ul style="list-style-type: none"> – полярность сварки; – силу тока в амперах; – напряжение; – скорость подачи проволоки; – скорость прохода электрода или горелки; – углы подачи электрода и углы между электродом и изделием; – способ переноса металла; • подготавливать кромку материала в соответствии со спецификацией и чертежом.

СВАРОЧНЫЕ МАТЕРИАЛЫ

A welder prepares, assembles and joins a wide range of metals and metal alloys.

Сварщик готовит, собирает и соединяет различные металлы и их сплавы.

The Competitor needs to know and understand:

- the mechanical and engineering properties of carbon steels,
- the mechanical and engineering properties of aluminium and its alloys (5000 and 6000 series),
- the mechanical and engineering properties of stainless steel (austenitic 300 series),
- selection, storage and handling of welding consumables,
- selection and safe use of electrical power tools,
- the influence of the time spent on the final cost of services,
- the supply costs of metals and consumables used for specific tasks,
- the control of material and welding operations in environmental protection.

Конкурсант должен знать и понимать:

- механические и технологические свойства углеродистых сталей;
- механические и технологические свойства алюминия и его сплавов (серии 5000 и 6000);
- механические и технологические свойства нержавеющей стали (аустенитная сталь серии 300);
- правила выбора, хранения и использования расходных материалов;
- правила выбора и безопасного использования электрооборудования;
- влияние затраченного времени на цену оказываемой услуги;
- стоимость поставки металлов и расходных материалов, используемых для выполнения конкретных задач;
- принципы контроля материалов и сварочных работ для безопасности окружающей среды.

The individual shall be able to:

- use materials with consideration to their mechanical and engineering properties,
- store welding consumables correctly with reference to type, use and safety considerations,

Специалист должен уметь:

- использовать материалы, учитывая их механические и технологические свойства;
- хранить расходные материалы правильно, учитывая их тип, способ использования и требования к безопасности;

- | | |
|--|---|
| <ul style="list-style-type: none"> • select and prepare materials with reference to drawing material list and welding symbols, • prepare materials according to their properties and surface characteristics, • use electrical power tools safely to cut, grind and prepare / finish welds,
 • use material efficiently with a view to supply and replacement costs, • carry out work effectively and efficiently with regard to environmental protection. | <ul style="list-style-type: none"> • выбирать и готовить материалы в соответствии с чертежом и условными обозначениями; • готовить материалы в соответствии с их свойствами и характеристиками поверхности; • использовать в соответствии с техникой безопасности электрооборудование для резки, шлифовки, подготовки / обработки сварных швов; • рационально использовать материал с учетом стоимости поставки и ремонта; • выполнять работу рационально и эффективно с учетом норм и правил в области охраны окружающей среды. |
|--|---|

СВАРОЧНЫЕ ПРОЦЕССЫ

Modern methods of joining include mechanized processes such as:

- submerged arc,
- plasma arc,
- stud welding,
- laser welding,
- various welding processes including MMAW (manual metal arc welding), MAGSW (metal arc gas shielded welding), TAGSW (tungsten arc gas shielded welding).

Современные методы соединения металлов включают следующие механические процессы:

- дуговая сварка;
- плазменная сварка;
- точечная сварка;
- лазерная сварка;
- различные сварочные процессы, включая ручную дуговую сварку по металлу, дуговую газовую сварку по металлу в защитных газах, дуговую газовую сварку с вольфрамовым электродом защитных газах.

The Competitor needs to know and understand:

- the international specifications for the control of weld quality,
- specific terminology used in the welding industry,
- the precautions necessary for the safe use of power tools and welding equipment,
- characteristics and safe use of welding and purging gases,
- selection of welding consumables,
- techniques of the various welding processes and their selection rules,
- the specific methods used in shielding the weld area from contamination,
- the selection of gases used for shielding and purging,
- weld positions, weld angles and electrode travel speeds,
- faults / inclusions that may occur during welding,
- methods of distortion control in steels, alloys and aluminium,
- appropriate methods of finishing completed welds,
- range of destructive and non-destructive weld testing,
- the techniques for efficient start / stop of work,
- the selection, adjustment and safe operation of electrical power tools,
- the methods used to control heat input,

Конкурсант должен знать и понимать:

- международные технические требования в области сварочного производства;
- специальную терминологию, используемую в сварочном производстве;
- меры предосторожности, необходимые для безопасного использования электроинструментов и сварочного оборудования;
- характеристики и правила безопасного использования сварочных и продувочных газов;
- процедуру выбора расходных материалов;
- методики различных сварочных процессов и правила их выбора;
- специальные методы защиты зоны сплавления от загрязнений;
- выбор газов, используемых для защиты и очистки;
- сварочные положения, угол наклона и скорость прохода электрода;
- дефекты / включения, которые могут наблюдаться при сварке;
- методы контроля деформации в стальных сплавах и алюминии;
- правильные методы обработки законченных сварочных швов;
- перечень разрушающих и неразрушающих типов тестирования сварочного шва;
- техники эффективного начала и прекращения работы;
- выбор, установку и безопасную эксплуатацию электрооборудования;
- методы контроля нагрева;

<ul style="list-style-type: none"> • methods and processes used in transfer of weld metal to the weld area, • the benefits of alloying to improve the properties of welding material, • the benefits and limitations of specific welding processes, • weld defects and their appropriate rectification, • the importance of weld metal cleanliness in weld quality. 	<ul style="list-style-type: none"> • методы и процедуры, используемые для переноса сварочного металла в зону сварки; • преимущества добавления примесей для улучшения свойств сварочного материала; • преимущества и ограничения при проведении определенных сварочных процессов; • сварочные дефекты и методы их устранения; • важность чистоты металла для качества сварки.
<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • make welded joints in relation to international specifications, • interpret welding terminology to complete task to specification, • maintain welding equipment to deliver quality results, • select and use appropriate method of shielding the weld area from contamination, • perform welding in all positions on pipe and plate for all nominated welding processes as detailed in ISO 2553 and AWS A3.0 / A2.4: <ul style="list-style-type: none"> — weld steel plate and sections using the manual metal arc welding process (III), — weld steel plate and sections using the gas metal arc welding process (135), 	<p>Сварщик должен уметь:</p> <ul style="list-style-type: none"> • делать сварочные швы в соответствии с международными стандартами; • понимать сварочную терминологию, чтобы выполнять задания; • поддерживать сварочное оборудование в состоянии, необходимом для достижения требуемых результатов; • выбирать и применять подходящий метод защиты места сварки от загрязнения; • производить сварку во всех положениях пластин и труб, используя любой из процессов, указанных в стандартах Международной организации по стандартизации ИСО 2553 и Американского общества специалистов по сварке A3.0 / A2.4: <ul style="list-style-type: none"> — производить сварку стальной пластины и секций путем ручной дуговой сварки (III); — производить сварку стальной пластины и секций путем газовой дуговой сварки металлическим электродом (135);

<ul style="list-style-type: none"> – weld steel plate and sections using the flux-cored welding process (136), – weld stainless steel plate and sections using the gas tungsten arc welding process (141), – weld aluminium plate and sections using the gas tungsten arc welding process (141), • dress welds using wire brushes, scrapers, chisels etc, • dress completed welds, • work accurately to drawing specification, • check completed work against drawing requirements to reflect accuracy, square and flatness where necessary, • set up and operate appropriate controls to minimize and correct distortion, • perform non-destructive weld testing, • recognize weld defects and take appropriate action to rectify them, • take appropriate actions to ensure that weld metal cleanliness is maintained. 	<ul style="list-style-type: none"> – производить сварку стальной пластины и секций путем дуговой сварки порошковой проволокой с флюсом наплавителем в активном газе (136); – производить сварку пластин из нержавеющей стали и секций путем дуговой сварки вольфрамовым электродом в газовой среде (141); – производить сварку алюминиевого листа и секций путем дуговой сварки вольфрамовым электродом в газовой среде (141); • защищать сварные швы шлифованием с использованием иглофрез, скребков, зубил и др; • обрабатывать выполненные сварные соединения; • работать точно по чертежу в соответствии с требованиями стандартов; • сверять результат работы с чертежами; • устанавливать и осуществлять необходимый контроль для минимизации и устранения деформаций; • проводить неразрушающие испытания сварных швов; • выявлять дефекты сварки и предпринимать необходимые меры по их устранению; • принимать соответствующие меры для поддержания чистоты сварного шва.
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ОБРАЗЦЫ ЗАДАНИЙ WORLD SKILLS

Образец 1. АЛЮМИНИЙ (с. 219)

Инструкции

1. Сварочный процесс GTAW (TIG) 141.
2. Сварочная позиция: все, кроме вертикальной внизу.
3. Сварочные работы должны быть выполнены с опорной пластиной А в устойчивой позиции.
4. Сварочные швы должны быть размером 4,00 мм (+2,00 мм / -0 мм) по длине шага.
5. Внешние сварочные углы должны быть размером 3,00 мм ($\pm 1,0$ мм).

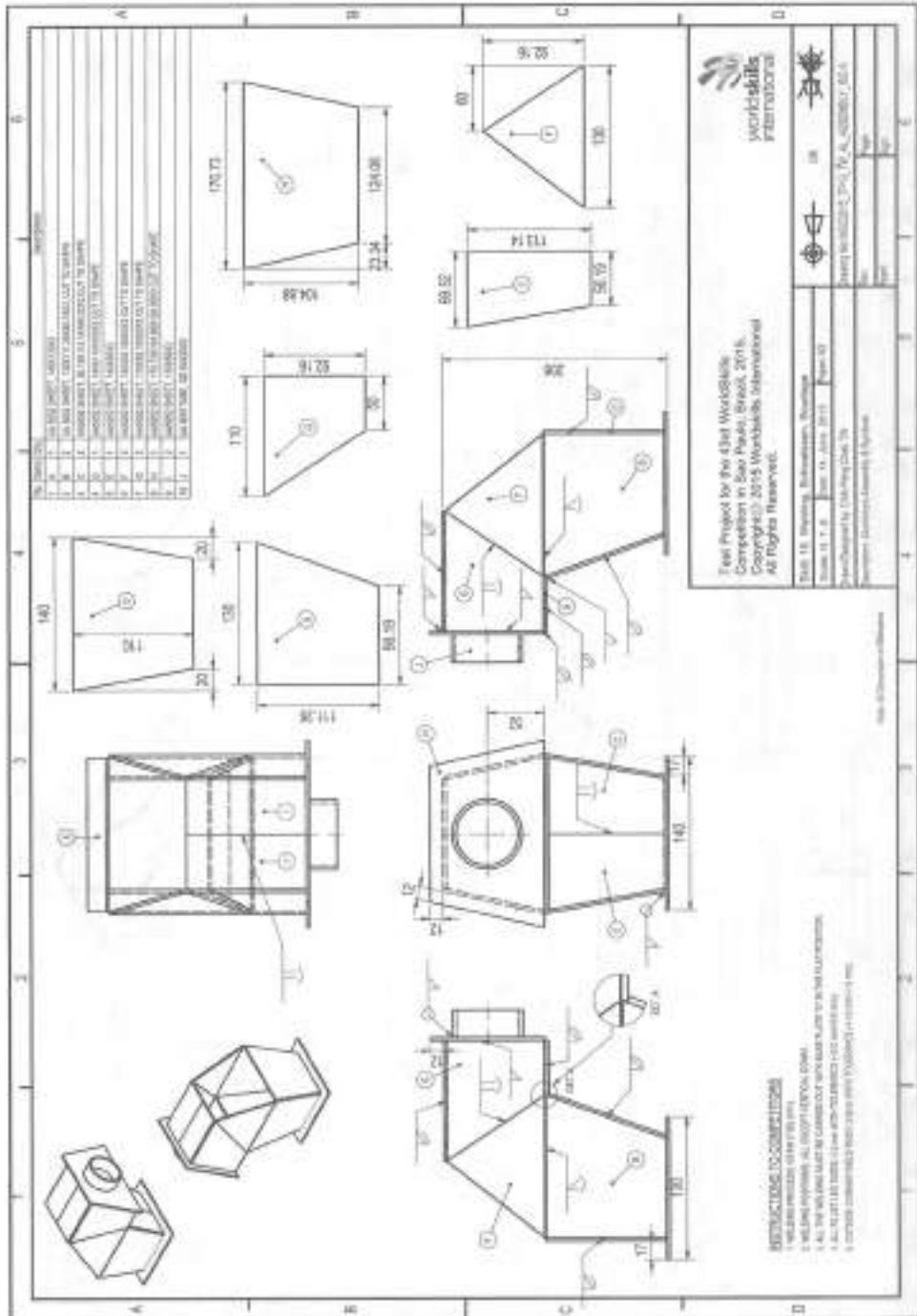
Образец 2. НЕРЖАВЕЮЩАЯ СТАЛЬ (с. 220)

Инструкции

1. Прихватки могут быть сделаны в любой позиции и логической последовательности GTAW (141) с сохранением структуры и быть доступными для обозрения. Все прихватки должны быть не длиннее 10 мм и выполнены только снаружи структуры. Делать как указано на чертеже.
2. Все сварочные швы должны быть 3,00 мм + 1,00 мм по длине шага.
3. Последующая шлифовка не разрешается.
4. Последующая чистка не разрешается.
5. GTAW с 100%-ным аргоновым защитным газом и продувкой.

Образец 3. УГЛЕРОДИСТАЯ СТАЛЬ (с. 221)

Прочитайте чертеж самостоятельно. Какое задание предложено конкурсанту?



WORLD
SKILLS
INTERNATIONAL



BRAZIL

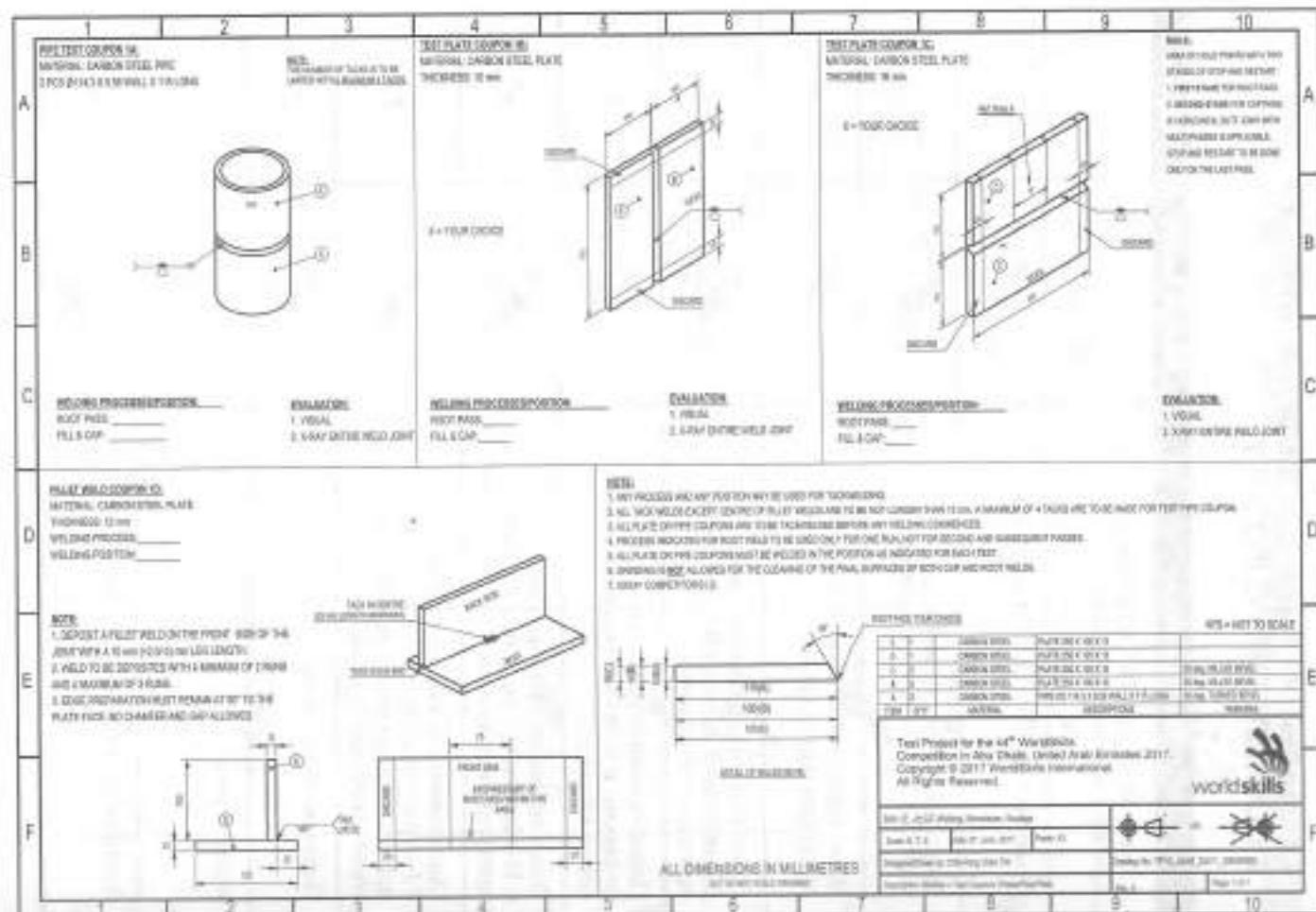
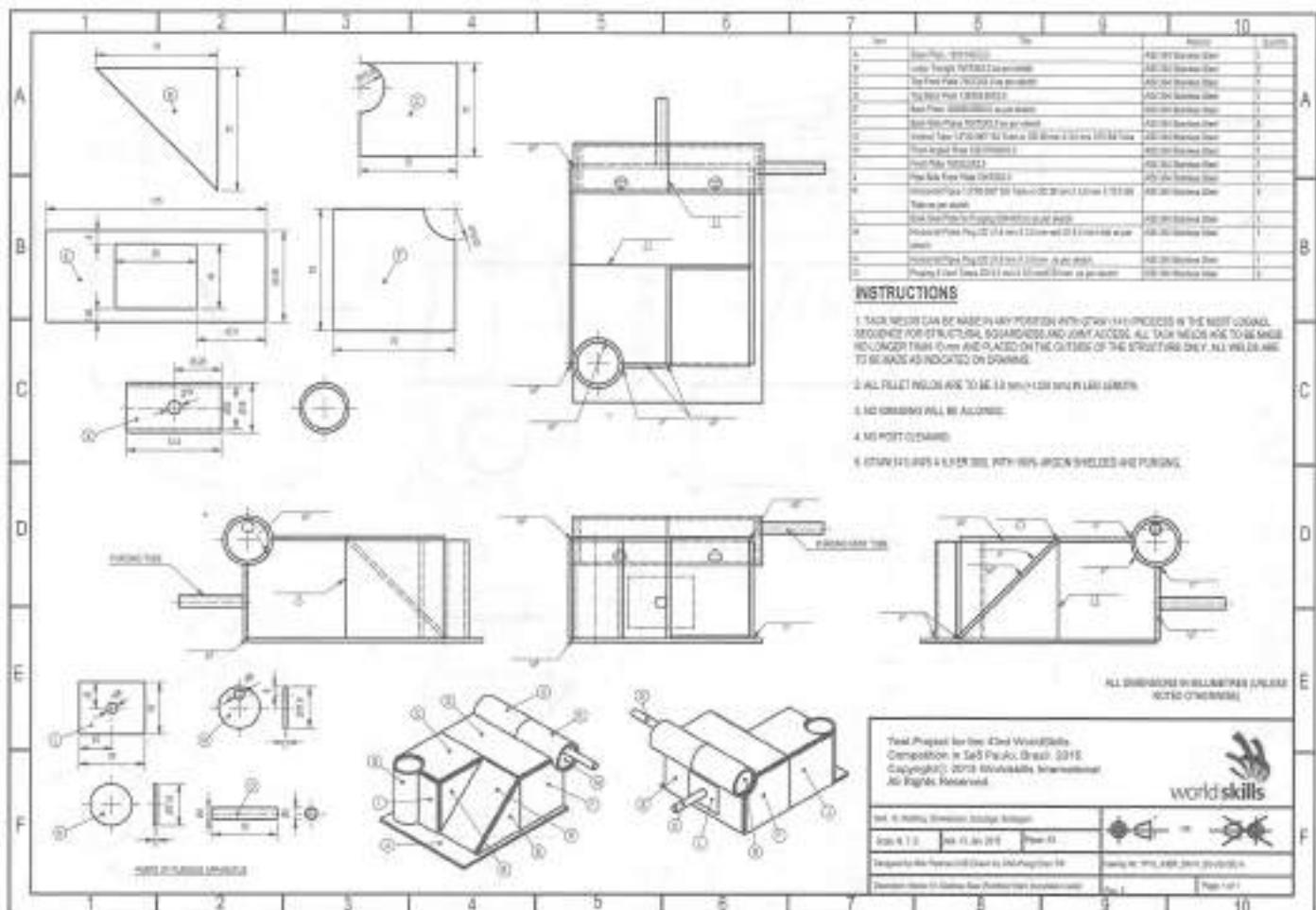
Test Project for the 43rd WorldSkills
Competition in São Paulo, Brazil, 2016.
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10

Dimensions in millimetres

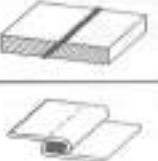
NOTES/CODES/DOCUMENTS USED

1. Metric system, all given in metric units.
2. All dimensions are given in metric units.
3. All dimensions are given in metric units.
4. All dimensions are given in metric units.
5. All dimensions are given in metric units.



ОБОЗНАЧЕНИЕ СВАРНЫХ ШВОВ НА ЧЕРТЕЖАХ В СООТВЕТСТВИИ С ISO 2553

Тип соединения	Иллюстрация	Символ
Стыковой шов между деталями с закругленными кромками		八字
Стыковой шов без разделки кромок		
Односторонний стыковой шов с V-образной разделкой кромок		▽
Односторонний стыковой шов со скосом одной кромки		∨
Односторонний стыковой шов с V-образной разделкой и большим притуплением кромок		Ү
Односторонний стыковой шов со скосом и большим притуплением одной кромки		Ւ
Односторонний стыковой шов с J-образной разделкой и большим притуплением кромок (с фигурной обработкой одной кромки)		Ւ
Подварка корня шва		D
Угловой шов		△
Проплавной (прорезной) шов		□

Тип соединения	Иллюстрация	Символ
Точечное соединение, выполненное контактной или дуговой сваркой		●
Накладочное соединение, выполненное шовной сваркой или проплавлением верхнего листа		⊕
Односторонний стыковой шов с V-образной разделкой кромок под малым углом наклона (узкая, щелевая разделка кромок)		▽
Односторонний стыковой шов со скосом одной кромки под малым углом		▽/
Торцевое соединение		
Наплавка поверхности		3
Соединение между поверхностями.		=
Соединение по наклонным поверхностям		↙
Соединение между завальцованными кромками		◎

УСЛОВНОЕ ОБОЗНАЧЕНИЕ СВАРНЫХ СОЕДИНЕНИЙ НА ЧЕРТЕЖАХ В СООТВЕТСТВИИ С ANSI/AWS A2.4

Символ	Type of weld	Вид
	Fillet Weld	Угловой шов
	Plug or Slot Weld	Пробковый или проплавной шов
	Spot or Projection Weld	Шов контактной точечной или рельефной сварки
	Seam Weld	Шовная сварка
	Back Weld or Backing Weld	Подварочный шов
	Surfacing Weld	Наплавка поверхности
	Melt Thru Weld	Сварной шов со сквозным проплавлением
	Square Weld	Шов без разделки кромок
	V Weld	Соединение с односторонним скосом двух кромок (V-образная разделка)
	Bevel Weld	Соединение со скосом одной кромки
	U Weld	Соединение с криволинейной разделкой двух кромок (U-образная разделка)
	J Weld	Соединение с криволинейной разделкой одной кромки (J-образная разделка)
	Flare-V Weld	Соединение деталей со скругленными кромками
	Flare-Bevel Weld	Сварной шов между плоской деталью и деталью со скругленной кромкой
		Паяный шов

СЛОВАРЬ ТЕРМИНОВ / GLOSSARY

A

abstergent	моющее средство
acid environment	кислая среда
acknowledgment	подтверждение
advance	продвигать
advantage	преимущество
allied	смежный, родственный
alloy	сплав
alternating current (AC)	переменный ток
aluminium	алюминий
ancient	древний
angle	угол
anvil	наковальня
appear	появляться
applicant	искатель
apply	применять
approximately	приблизительно
arc	дуга
arc welding (AW)	дуговая сварка
armoury	оружие, вооружение
assess	оценивать
atomic hydrogen welding	атомно-водородная сварка
austenitic	аустенитный
autogenous weld	автогенная сварка
avoid	избегать

axe	топор
axle	вал, ось, шпиндель
В	
backhand welding	сварка обратным способом
beam	луч
blacksmith	кузнец
bolt	болт
bond	соединение
bradawl	шпилко
brass	латунь, желтая медь
braze	паять; паять твердым припоем
brazing filler metal	твердый припой
brick	кирпич
bridge	мост
brief pressure	короткое нажатие
brittle	хрупкий, ломкий
bronze	бронза
build-in	встроенный
burn (the skin)	обжигать (кожу)
butt-seam welding	шовно-стыковая сварка
С	
caliper	штангенциркуль
cantilever	консоль, кронштейн
capacity	мощность
carbon	углерод
carbon arc welding (CAW)	углеродистая дуговая сварка
carbon dioxide	углекислый газ
cause	вызывать
cement	цемент
chisel	долото, зубило

circular saw	циркулярная пила
clamp	струбцина; фиксировать, зажимать
clay	глина
coil	змеевик
cold welding	холодная сварка
compatible	совместимый
composite joint	композитное соединение
concave	вогнутый
concrete	бетон
construction	строительство
consumables	расходные материалы
continuous weld	непрерывный сварной шов
coping saw	лобзик
copper	медь
cutlery	столовые приборы, ножи
cutout switch	автоматический выключатель
CV	рекоме

D

damage	повреждать, разрушать
decrease	уменьшить
deflection	деформация, отклонение
density	плотность
dent-resistant	стойкий к повреждениям
develop	развивать
deviation	девиация, отклонение
diffusion bonding	диффузное соединение
dimension	размер
direct current (DC)	постоянный ток
disc welding	сварка с прокладкой дисков
distinction	отличие

drawback	недостаток
ductile	поддающийся обработке, пластичный, ковкий
durability	прочность, износостойчивость
durable	стойкий, долговечный
dust	пыль
E	
ear defenders	наушники
earth-wire	заземленный провод
edge preparation	обработка шва, края
elasticity	упругость
electric drill	электрорель
electrogas welding (EGW)	электргазовая сварка (ЭГС)
electron beam welding	электронно-лучевая сварка
electroslag welding	электрошлаковая сварка
emit	излучать
equipment	оборудование
event	событие, мероприятие
expansion	расширение, увеличение в объеме
explosion welding	сварка взрывом
extrude	выдавливать, вытеснять
F	
face of weld	наружная поверхность шва
face reinforcement	поверхностное усиление
feature	характеристика, черта
ferritic	ферритный
fever	лихорадка
fibreglass	стекловолокно
file	напильник
fixed-position welding	сварка с фиксированной позицией

flame	пламя
flash welding	стыковая сварка оплавлением
flat-position welding	сварка плоской поверхности
flow meter	газомер
flow welding	сварка потоком
flux	флюс
flux-cored arc welding	сварка дуговая порошковой проволокой с флюсовым наполнителем в активном газе
foil	фольга
forehand welding	прямая сварка
forge welding	кузничная сварка
forging	ковка
framing square	прямоугольник
friction	трение
friction welding	сварка трением (фрикционная сварка)
front	передний
fume	дым, угар
fuse	плавкий предохранитель, плавить, расплавлять
fusion welding	сварка плавлением
G	
gap	зазор
gas metal arc welding	сварка дуговая сплошной проволокой в инертном газе
gas valve	газовый клапан
gas tungsten arc welding	сварка дуговая вольфрамовым электродом в инертном газе с присадочным сплошным материалом (проводкой или стержнем)
get acquainted	познакомиться
glass	стекло

gloves	перчатки
goggles	очки
gold	золото
gravel	гравий
grinding machine	шлифовальная машина, болгарка
groove weld	сварочный стык
gun barrel	ружейный ствол

Н

hacksaw	ножовка
hammer	молоток
hammer welding	кузнецкая сварка
handsaw	ручная пила
harden	затвердевать
hatchet	топорик
heat	нагревание
helium	гелий
helmet	шлем
high	высокий
hold the button / knob	нажать на кнопку
hole	отверстие
horizontal-position welding	горизонтальная сварка
horn	шпиль, головка
hose	шланг, рукав
hot pressure welding	горячая сварка под давлением
household hardware	домашние приборы
hydrogen	водород

I

immediate	мгновенный
impact	влияние
in	внутрь

increase	увеличивать
indoor	в помещении
inhale	вдыхать
install	устанавливать
installation	установка
insufficient impedance	недостаточное сопротивление
intermittent weld	прерывистый сварной шов
introduce	представлять
invent	изобретать
iron	железо
item	предмет

J

jam welding	сварка встык
join	соединять

L

lap joint	простое соединение внахлестку
laser beam welding	сварка лазерным лучом
lateral cracking	продольное растрескивание
latest achievements	последние достижения
layer	слой
lead	свинец
LED	индикатор, светодиод
level	уровень
light-weight	легкий (по весу)
lime	известь
low consumption	низкое потребление (энергии)

M

machinability	обрабатываемость
machine plate	металлическая пластина с техническими данными

machine welding	механизированная сварка
magnesium	магний
magnetically impelled arc butt	сварка дугой, приводимой в движение магнитным полем
maintenance	техническое обслуживание
make a breakthrough	делать прорыв
malleable	ковкий, тягучий
mallet	отбойный молоток
manual	ручной
manufacturer	производитель
martensitic	мартеновский
masterpiece	шедевр
melt	плавление, расплав; плавить
mercury	ртуть
metal	металл
metal arc welding	дуговая сварка металлическим электродом
mild	мягкий
mining	добыча полезных ископаемых
molten	расплавленный
monkey wrench	разводной ключ
more	больше
motor shaft	вал тягового двигателя
mud	грязь

N

nail	гвоздь
net weight	вес нетто, чистый вес
nickel	никель
nitrogen	азот
non-consumable	неплавящийся

non-destructive	неразрушающий
nozzle	насадка, форсунка, сопло сварочной горелки
nut	гайка
О	
oar	руль
out	вовне
outdoor	вне помещения
overall	комбинезон, спецодежда
overtime	сверхурочный
oxygen	кислород
Р	
paint thinner	растворитель для краски
patina	патина
penetration	проникновение
pipe welding	сварка труб
pipeline	трубопровод
plain	простой
plane	самолет
plasma arc welding	плазменная дуговая сварка
plastic	пластик; пластмассовый
platinum	платина
pliers	плоскогубцы
plug	вилка, штекер
plug up	затыкать
pneumatic tool	пневматический инструмент
porosity	пористость
positioned weld	позиционная сварка
possess	обладать
possible	возможный

postheating	послесварочный отжиг
postweld heat treatment	термообработка после сварки
power cord	шнур питания
power source	источник питания
power supply cable	кабель питания
precious	драгоценный
precipitation hardening	дисперсионное твердение
precision	точность
pressure gas welding	газовая сварка давлением
pressure welding	сварка под давлением
prevent a damage	предотвращать разрушение
previous	предыдущий
prone	предрасположенный, подверженный
protective face shield	защитный щиток для лица
punch	пружина
punch press	пресс-штамп
push welding	точечная сварка

R

rear	задний
rear axle	задний мост (ось)
rectifier frequency converter	выпрямитель преобразователя частоты
recycle	перерабатывать
reliable	надежный
remote control	пульт управления
repair	ремонт
repairing service	ремонтный сервис
resistance welding	сварка сопротивлением
resonant frequency	резонансная частота
revolve	вращаться

roll welding	роликовая сварка
root penetration	проникновение корня шва
rubber	резина
rubber rug	резиновый коврик
rust	ржавчина; ржаветь
S	
sand	песок
sandpaper	наждачная бумага
saw	ручная пилка
scientist	ученый
scraper	скребок
scratch	царапина; царапать
screw	винт
screwdriver	отвертка
seam welding	сварка швом
series welding	последовательная сварка
sheet	лист (металла)
shielded gas	защитный газ
shielded metal arc welding	сварка ручная дуговая плавящимся электродом
shift	смена
ship	корабль
short-arc welding	сварка короткой дугой
shrinkage crack	усадочная трещина
silver	серебро
skill	умение
slate	сланец
smoke	дым
socket	розетка
solder	мягкий припой

soldering iron	паяльник
solution of the problem	решение проблемы
splash	разбрызгивать
spool	катушка
spot welding	точечная сварка
spring	пружина
steam	пар
steel-toed boots	ботинки со стальным носком
steel wire brush	щетка из стальной проволоки
step ladder	стремянка
stiffness	жесткость, твердость
strain	деформация
submerged arc welding	сварка дуговая под флюсом сплошной проволокой
suitable	подходящий
supplier	поставщик

T

thickness	толщина
tin	олово; жесть
too much spatter	слишком много брызг
torch	горелка
trace	след; следить
tube	труба
tube welding	сварка труб
tungsten	вольфрам

U

ultrasonic welding	ультразвуковая сварка
universal welding gauges	универсальный шаблон сварщика (УШС)
up-to-date	современный

uranium	уран
utensils	посуда

V

valve	клапан
vapour	пар, испарение
velocity	скорость
vise	тиски
voltage	напряжение

W

wear resistance	износостойкость
weld bead	сварочный шов; наплавленный валик сварного
weld crack	трещина в сварочном шве
weld decay	коррозия сварного шва
welding current	сварочный ток
welding cycle	сварочный цикл
welding torch	сварочная горелка
welding zone	зона сварки
widely	широко
wire	проволока; провод
wire speed	скорость подачи проволоки
work clamp	зажим заземления
workbench	верстак
wrench	гаечный ключ

Z

zinc	цинк
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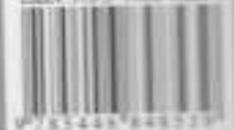
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