Тема занятия: Первые сварочные процессы.

Цели занятия: выучить лексический материал по теме «Первые сварочные процессы»; совершенствовать навыки чтения и перевода текста профессионального направления; систематизировать знания, выполнив задания по теме занятия.

Уважаемые студенты! Ознакомьтесь с материалами практического занятия на тему «Первые сварочные процессы». Конспект занятия выполняйте **в рабочей тетради письменно**, **обязательно указывая дату занятия, тему занятия, номер упражнения.** Ответы предоставить преподавателю на проверку **до 09. 03. 2023 г.** в электронном виде **(фотоотчёт)** на e-mail mikagol2605@mail.ru. Телефон преподавателя для консультации и возникающих вопросов: 072-14-15-816.

С уважением, Голодюк Марина Викторовна.

1. **Выпишите в словарь новую лексику. Выучите новую лексику.**
2. **Прочитайте и устно переведите текст «Welding History - A Story of Harnessing Heat».**
3. **Дайте письменно ответы на вопросы к тексту.**

Welding History - A Story of Harnessing Heat

Vocabulary:

forge welding – кузнечная сварка

blacksmith – кузнец

forging operation – ковка

advances – достижения

blowtorch – паяльная лампа

oxyfuel welding – кислородно-топливная сварка

flux – поток

carbon electrode – угольный электрод

thermite welding – термитная сварка

resistance welding – контактная сварка

surge – всплеск

fuselages – фюзеляжи

shielding gas – защитный газ

torches – факелы

flux-cored arc welding – порошковая сварка

laser beam welding – лазерная сварка

Joining metal and welding history go back several millennia starting in the Bronze Age then Iron Age in Europe then the Middle East. Welding was used in the Iron pillar in Delhi, India, about 310 AD, weighing 5.4 metric tons. The Middle Ages brought forge welding, blacksmiths pounded hot metal until it bonded. In 1540, Vannoccio Biringuccio released De la pirotechnia, which includes descriptions of the forging operation. Renaissance craftsmen gained skilled in the process, and the welding continued to grow during the following centuries.

Welding was transformed during the 19th century. In1800, Sir Humphrey Davy invented the electric arc, and advances in welding continued with the metal electrode by a Russian, Nikolai Slavyanov, and an American, C.L. Coffin late in the 1800s.

Acetylene was discovered in 1836 by Edmund Davy, but was not practical in welding until about 1900, when a suitable blowtorch was developed. At first, oxyfuel welding was the more popular welding method due to its portability and relatively low cost. As the 20th century progressed, it fell out of favor for industrial applications. It was largely replaced with arc welding, as metal coverings (known as flux) for the electrode that stabilize the arc and shield the base material from impurities continued to be developed.

In 1881 a Russian inventor, Benardos demonstrated the carbon electrode welding process. An arc was formed between a moderately consumable carbon electrode and the work. A rod was added to provide needed extra metal.

Thermite welding was invented in 1893, another process, oxyfuel welding, became well established.

Around 1900, A. P. Strohmenger brought a coated metal electrode in Britain, which had a more stable arc, and in 1919, alternating current welding was invented by C.J. Holslag, but did not become popular for another decade.

Resistance welding was developed during the end of the 19th century, with the first patents going to Elihu Thompson in 1885, and he produced advances over the next 15 years.

In 1904 Oscar Kjellberg in Sweden, who started ESAB, invented and patented the covered electrode. This electric welding process made strong welds of excellent quality.

World War I caused a major surge in the use of welding processes, with the various military powers attempting to determine which of the several new welding processes would be best. The British primarily used arc welding, even constructing a ship, the Fulagar, with an entirely welded hull. The Americans were more hesitant, but began to recognize the benefits of arc welding when the process allowed them to repair their ships quickly after a German attack in the New York Harbor at the beginning of the war. Arc welding was first applied to aircraft during the war as well, as some German airplane fuselages were constructed using the process.

During the 1920s, major advances were made in welding technology, including the introduction of automatic welding in 1920, in which electrode wire was fed continuously.

Shielding gas became a subject receiving much attention, as scientists attempted to protect welds from the effects of oxygen and nitrogen in the atmosphere. Porosity and brittleness were the primary problems, and the solutions that developed included the use of hydrogen, argon, and helium as welding atmospheres.

During the following decade, further advances allowed for the welding of reactive metals like aluminum and magnesium. This, in conjunction with developments in automatic welding, alternating current, and fluxes fed a major expansion of arc welding during the 1930s and then during World War II.

A significant invention was defined in a patent by Alexander, filed in December 1924, and became known as the Atomic Hydrogen Welding Process. It looks like MIG welding but hydrogen is used as the shielding gas which also provides extra heat. A major innovation was described in a patent that defines the Submerged Arc Process by Jones, Kennedy and Rothermund. This patent was filed in October 1935 and assigned to Union Carbide Corporation. The following was excepted from an article written by Bob Irving in the Welding Journal: “The importance of welding was emphasized early in the war when President Roosevelt sent a letter to Prime Minister Winston Churchill, who is said to have read it aloud to the members of Britain's House of Commons. The letter read in part, "Here there had been developed a welding technique standard merchant ships with a speed unequalled in the history of merchant shipping."

Russell Meredith working at Northrop Aircraft Company in 1939-1941 invented the TIG process. This new process was called "Heliarc" as it used an electric arc to melt the base material and helium to shield the molten puddle. Mr. Jack Northrop's dream was to build a magnesium airframe for a lighter, faster warplanes and his welding group invented the process and developed the first TIG torches. The patents were sold to Linde who developed a number of torches for different applications. They also developed procedures for using Argon which was more available and less expensive than Helium.

In 1957, the flux-cored arc welding process debuted, in which the self-shielded wire electrode could be used with automatic equipment, resulting in greatly increased welding speeds, and that same year, plasma arc welding was invented. Electroslag welding was released in 1958, and it was followed by its cousin, electrogas welding, in 1961.

Other recent developments in welding include the 1958 breakthrough of electron beam welding, making deep and narrow welding possible through the

concentrated heat source. Following the invention of the laser in 1960, laser beam welding debuted several decades later, and has proved to be especially useful in high-speed, automated welding. Both of these processes, however, continue to be quite expensive due the high cost of the necessary equipment, and this has limited their applications.

Дайте <u>письменно</u> ответы на вопросы к тексту.

1. Which process was developed earlier, MIG or TIG?
2. Why is rod added in carbon electrode welding?
3. What is the difference between the Atomic Hydrogen Welding process and the MIG process?
4. What kind of gas was first used to shield the molten puddle?
5. Is tungsten electrode consumable?