

Specialty description

05.03.06 – WELDING AND RELATED PROCESSES AND TECHNOLOGIES

I. Specialty Definition

The area of science and technology which studies nature of bonds and mechanism of physical and chemical phenomena occurring in process of formation of permanent joints of metals, ceramic-metal and organic materials in atmosphere, vacuum and underwater conditions. The joint formation processes may include heating sources using transformation of electrical, chemical, mechanical and other energy types into heat. This area develops perspective methods, technologies and equipment for the use of welding, coating, brazing, soldering, surfacing, thermal cutting and other related processes. This area creates scientific fundamentals and control means for permanent joints' quality control, develops methods of designing, production, strength, reliability and service life evaluation for welded constructions and parts with coatings.

II. Research Areas

Theory of welding processes and other related processes and technologies. Simulation of physical and chemical phenomena occurring in process of formation of permanent joints and coating.

Physical and metallurgical processes in welding, coating, brazing, soldering and other related processes. Weldability of materials. Coating production problems.

Effect of thermal-deformational cycle in process of formation of permanent joints on their quality and technological strength.

Metallurgical and technological problems of development and production of electrodes and filler materials, fluxes, powders, etc.

Principles of development of modern equipment for material joining using fusion welding, pressure welding, brazing, soldering, etc, for coating processes, thermal cutting and other related processes.

Automation and robotic application of welding and related processes and technologies.

Stressed state of welded joints and constructions, experimental and calculative methods of its evaluation, methods of control.

III. Area of Scientific Degree

Technical sciences