Technological Machines and Equipment

South Ural State University

Degree or qualification is awarded: **Master's degree**

Language of study: **Russian**
Mode of study: **full-time**
Duration: **2 years**
Availability of free education: **no**
Price: **161 600 rubles**

Programme webpage at the university website:
https://www.susu.ru/en/education/masters-degree-programs/150402-technological-machines-and-equipment-hydraulic-m-machines

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Graduate students in the learning process under this program are carried out in-depth fundamental and professional preparation for industrial and scientific research, study in detail modern technologies and equipment, studying the features of construction and operation of equipment for production and processing of materials by pressure. The graduates can carry out the following activities: - industrial and technological: to lead work on commissioning and maintenance of modern Russian and foreign metallurgical equipment. - process engineering: management engineering for the design and reconstruction of the equipment for production and processing of metals, coordination and support of implementation of scientific developments into production. - organization and management: managing large and medium work teams, evaluation innovation and technological risks in implementing new technologies and equipment. Graduates can work as an engineer with the prospect of growth to the head of site management, production, chief engineer of the enterprise.

Specializations within this programme

Technological Machines and Equipment (Hydraulic m Machines, Hydrodrives and Hydraulic and Pneumatic Control Systems)

1. Areas of professional knowledge

Areas of professional knowledge of graduates: teaching, as well as science and technology containing a set of tools, techniques and methods aimed at creating competitive products of mechanical engineering and based on: the use of modern methods of design, calculation, mathematical, physical and computer modeling; the use of design and technological information and computer-aided design; creation of quality management systems in the context of specific conditions of production on the basis of international standards; conducting market research using optimal solutions for creation of products subject to quality, reliability and cost requirements, as well as to the production time, life safety and environmental soundness.

2. Objects of professional activity

The objects of professional activity of graduates:

- machinery and equipment of various complexes and mechanical engineering industries, technological equipment;
- vacuum and compressor machines, hydraulic machines, hydro-drives and hydraulic and pneumatic control systems;
- technological equipment and means of mechanization and automation of technological processes of mechanical engineering;
- production processes, their development and development of new technologies;

- means of information, metrological, diagnostic and management support of technological systems employed to achieve the quality of products;
- normative and technical documentation, standardization and certification systems, methods and means of testing and quality control of engineering products;
- work in the sphere of education.

3. Types of professional activity:

- Industrial-technological;
- design and engineering;
- research and teaching;
- organizational and managerial.

4. Professional activities:

- production and technological activities:
- design of machines, drives, systems, technological processes with the use of automated systems of technological preparation of production of machines, drives, systems;
- development of production standards, technological standards for the consumption of materials, fuel and electricity, as well as the choice of equipment and tools;
- development of technical specifications for the design and manufacture of machines, drives, systems, non-standard equipment and technological equipment for machines, drives, systems;
- ensuring the manufacturability of products and manufacturing processes of mechanical engineering;
- assessment of economic efficiency of technological processes;
- research and analysis of the causes of defects in the design, manufacture, testing, operation, disposal of technical products and systems and development of proposals for its prevention and elimination;
- development of measures for the integrated use of raw materials, finding alternatives for scarce materials and finding ways to recycle production waste;
- selection of systems for ensuring environmental safety in the conduct of work;
- implementation of technical control and quality management in the design, manufacture, testing, operation, disposal of technical products and systems; taking into account set of international standards ISO 9000
- in order to ensure a high level of quality;
- organizational and management activities:
- organization of work of the group of workers, decision-making in the context of meeting with opposition and different views, establishing the order work;
- taking into account the requirements of quality, reliability and cost, as well as deadlines, safety and environmental cleanliness in the search for optimal solutions in the course of creation of products;
- prevention of industrial injuries, occupational diseases, prevention of environmental violations;
- preparation of applications for inventions and industrial designs; assessment of the value and cost of intellectual property;
- organization in the units of works on improvement, modernization, unification of products and their elements, development of draft standards and certificates;
- organization of advanced training for of employees of units in the field of innovation;
- writing reviews and opinions on draft standards, rationalization proposals and inventions;
- organization of works on the implementation of supervision in the manufacture, installation, calibration, testing and commissioning of manufactured products and facilities;
- marketing and preparation of business plans for the production and implementation of promising and competitive products;
- adaptation of modern versions of quality management systems to specific production conditions on the basis of international standards;
- support of a single information space for enterprise planning and management at all stages of the product life cycle;
- development of plans and programs of organization of innovative activity at the enterprise;
- management of new product and technology development programs;
- the coordination of personnel for the integrated solutions of innovative problems-from idea to serial production;
- research and teaching activities:
- formulation, planning and conducting research of theoretical and applied nature on the subjects of the sphere of professional activity;
- development of models of physical processes;

- development of new methods of experimental research; analysis of research results and their formulating underlying principles;
- writing scientific and technical reports, reviews and publications on the results of research and development;
- fixation and protection of intellectual property;
- management of research results and commercialization of intellectual property rights;
- the use of modern psychological and pedagogical theories and methods in professional activities;
- design and development activities:
- development of perspective designs;
- taking into account environmental and energy-saving technologies in the context of optimization of design solutions;
- creation of applied calculation programs;
- expert analysis of design and technological developments;
- conducting patent research to ensure novelty and patentability of new design solutions and to determine the technical level of the designed products;
- development of conceptual, technical and working designs of complex products with the use of computer-aided design and advanced experience in the development of competitive products;
- carrying out technical calculations on projects, technical-economic and functional-cost analysis of the efficiency of the designed products and structures;
- development of methodological and regulatory documents, technical documentation, as well as proposals for the implementation of the developed projects and programs;
- evaluation of innovative potential of projects;
- assessment of innovative risks of commercialization of projects.

Technological Machinery and Equipment (Metallurgical Production Machinery and Units)

The knowledge and skills obtained by students are from the sections of science and technology containing techniques and methods to research promising competitive patterns of engineering products.

The scope of professional activity of graduates who have mastered this programme includes teaching and research activities in higher education institutions, experimental design bureaus, innovation centres and technology parks.

The unique character of the programme lies in its broad diversified interdisciplinary training with a powerful potential for further use in almost all spheres of industry, including such promising industries as robotics, mechatronics, flexible systems with artificial intelligence, etc.

Technological Machinery and Equipment (Metallurgical Machinery and Equipment)

Graduates of this programme are trained for design, production, technological, organizational, managerial and research activities both in design and development organizations and in metallurgical and machine-building companies in Russia.

Training under the programme will allow the graduates to work on the creation of competitive products in the field of mechanical engineering, as well as to carry out maintenance of high-tech equipment. When teaching students, the formation of the required FSES competencies is carried out using modern teaching methods and techniques. At the disposal of teachers of the Department there are modern means of designing, mathematical, physical and computer modelling; a big variety of industrial and laboratory equipment.

For internships, course and diploma designing, the Department has close long-term ties with enterprises of the city and the region. Such close ties with the SUSU innovation laboratories, such as Mechanical Engineering Research Institute, Laboratory of Mechanics, Laser Processes, and Digital Production Technologies, and others help students to conduct research and development works on the most modern equipment and on the most popular projects of the customer enterprises.