SATBAYEV UNIVERSITY	NON-PROFIT JOINT STOCK COMPANY «KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY named after K.I.SATBAYEV»
	COMPETENCY MODEL OF A GRADUATE Type of regulatory document

COMPETENCY MODEL OF A GRADUATE

of the Kazakh National Research Technical University named after K.I. Satpayev

for Educational Program 6B07220 «Machines and technologies for processing new materials»

Almaty 2025

Non-profit Joint Stock Company "KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY named after K.I. SATPAYEV"

APPROVING
Director of the Burkitbaev Institute of Energy and Mechanical Engineering
_____ K.K.Yelemessov
" 25 " 10 2025 y.

COMPETENCY MODEL OF A GRADUATE

6B07220 «Machines and technologies for processing new materials»

1 Purpose of the educational program:

Training of highly qualified and competitive specialists to successfully solve scientific and engineering problems, capable of solving scientific and engineering problems in the field of materials processing, taking into account development control. The program focuses on the design and implementation of progressive, resource-saving and environmentally sound technological processes, the development of innovative employment, as well as ensuring high-quality, accessibility and practice-oriented training in order to implement the SDGs.

2 Objectives of the educational program:

- Formation of knowledge of modern information technologies;
- acquisition of theoretical and practical knowledge of computer design of products of procurement production;
- mastery of methods and methods of mathematical and 3D modeling;
- acquisition of professional competencies in accordance with the requirements of industry professional standards;
- acquisition of knowledge of the basics of technological processes of stamping, forging, rolling and design of technological processes for obtaining billets;
- acquisition of knowledge of new materials, nanomaterials, nanopowders and technologies for their production;
- formation of knowledge on the main trends in the development of technologies for processing new materials, introduction of innovative digital technologies.

3 Professional subjects

The subjects of the bachelor's professional activity in OP 6B07220 "Machines and technologies for processing new materials" are: Technological equipment of procurement workshops of machine-building enterprises, tools, equipment, design solutions, automated complexes, tools, equipment debugging tools, operating tools, equipment maintenance tools for processing materials by pressure.

4 Decomposition of key tasks of the specialty into clusters of "related" competencies.

Bachelor in OP 6V07220 - Machines and technologies for processing new materials should solve the following professional problems:

- organizational and management: organization of the production process, organization of the work of performers; setting a goal and forming a management task related to the implementation of professional functions; organization of production maintenance; organization of work of small teams of performers; establishment of work execution procedure and organization of technological production routes; planning of process equipment arrangement; control of compliance of technical documentation of developed projects with standards, specifications and other regulatory

documents;

- production process management taking into account technical, financial and human factors; development of control algorithms; planning of accounting and reporting, development of business plan of the enterprise, planning of improvement of production efficiency;

- production and technological: development, implementation and operation of system, resource-saving technologies; development and implementation of technological processes for processing and assembly of products; automation of machine-building production; conducting experimental studies to analyze and optimize the characteristics of materials used in mechanical engineering; development of standard maintenance processes using existing methods.

- design and engineering: execution of design and graphic works in the design of automation systems, design of highly efficient means of technological equipment; justification of the criteria for assessing the technical and economic efficiency of the designed systems;

- design and calculation: development of calculation schemes in the design of equipment systems, tooling and tools; Perform calculations for use in construction documents justification of calculation methods;

- experimental research: application of modern experimental methods to study the processes occurring in machine-building production; research of new directions in technology of modern mechanical engineering; research of types of processing in mechanical engineering; research of automation objects in the field of mechanical engineering; scientific justification of methods for ensuring the quality of manufactured products and increasing labor productivity.

Areas of professional activity:

- technological processes of procurement production in mechanical engineering;
- design and construction of various types of equipment for material processing processes;
- repair and maintenance of production equipment, tooling and tools;
- experimental research works.

5 Requirements for the key competencies of the bachelor in OP 6V07220 - "Machines and technologies for processing new materials "

This educational program is focused on the preparation of bachelors in the field of technology for processing metals and non-metallic materials, as well as the creation of technological processes for processing new materials.

Learning outcomes are expressed through competencies and designed based on Dublin Level 1 Descriptors (Undergraduate). Layer 1 descriptors assume abilities:

- demonstrate knowledge and understanding in the area under study, including elements of the most advanced knowledge in this area;
- apply this knowledge and understanding at a professional level;
- formulate arguments and solve problems in the area under study;
- collect and interpret information for generation

judgments taking into account social, ethical and scientific considerations;

- communicate information, ideas, problems and solutions to both specialists and non-specialists.

When determining competencies, training results formed in the PD, and in the future, to form the content of training, the following were used as initial data:

- requirements of the State compulsory standard of higher and postgraduate education approved by the Decree of the Government of the Republic of Kazakhstan dated August 23, 2012 No. 1080;
- needs of regional, republican, national and international labour markets;
- survey of all stakeholders to determine competencies.

General competencies of higher education are formed on the basis of requirements for general education, socio-ethical competencies, economic and organizational and managerial competencies, special competencies.

6 Competency model of the specialist based on the results of the educational program

General competencies of bachelor in OP 6B07220 - Machines and technologies for processing new materials	Form of competency manifestation
General education requirements	Possession of basic knowledge in the field of natural sciences (social, humanitarian, economic) disciplines that contribute to the formation of a highly educated personality with a broad outlook and culture of thinking; possessing skills in handling modern technology, the ability to use information technologies in the field of professional activities; proficiency in acquiring new knowledge necessary for daily professional activities. The ability to navigate the world around us, analyze modern processes, aware of them in the context of historical time, respectfully and carefully treat historical heritage and cultural traditions. The ability to use, summarize and analyze information, set goals and find ways to achieve them in the context of the formation and development of the information society. Willingness to use basic methods, methods and means of obtaining, storing, processing information, willingness to work with a computer as a means of managing information; use modern software tools for the execution and editing of images and drawings, the ability to work with design and technological documentation; willingness to work with information in global computer networks. The ability to use basic knowledge of mathematics and physics in cognitive and professional activities.
Requirements for socio-ethical competencies	Knowledge of social and ethical values based on public opinion, traditions, customs, social norms and orientation to them in their professional activities; compliance with business ethics, knowledge of ethical and legal standards of conduct; knowledge of the traditions and culture of the peoples of Kazakhstan; be tolerant of traditions, culture of other peoples of the world; knowledge of the fundamentals of the legal system and legislation of the Republic of Kazakhstan; ability to adequately navigate various social situations; be able to work in a team, correctly defend their point of view, propose new solutions, find compromises, correlate their opinion with the opinion of the team; striving for professional and personal growth. Master the skills of scientific research of political processes and relations, methods of analysis and interpretation of ideas about politics, state and power. Ability and readiness for social interaction with society, community, team, family, friends, partners; cooperation and conflict resolution; to tolerance, respect and acceptance of the other. Ability to use regulatory documents of the Republic of Kazakhstan in professional activities, legal moral and ethical standards.

	Ability and willingness to work in an international environment, accepting differences and multiculturalism. The ability to understand the place and role of ecology in solving modern economic and political problems. The ability to understand the social significance of physical culture and sports, their role in everyday life, in personal development and preparation for professional activities. Strive for professional and personal growth.
Requirements for economic, organizational managerial competencies	Knowledge and understanding of the goals and methods of government regulation of the economy, the role of encies. Ability to understand the principles, laws and models of economic theory for industry analysis. Ability to analyze the economic characteristics of the infrastructure of the radio, electronics and telecommunications industries; ability to find a compromise between different requirements (cost, quality, safety and deadlines) both in long-term and short-term planning and determination of optimal solutions. Know and understand the goals and methods of state regulation of the economy, the role of the public sector in the economy. Ability to analyze natural, man-made and social phenomena and events, identify the causes of their occurrence and possible consequences, design models of personal safe behavior. The ability to participate in the development of a strategy for the management of human resources of organizations, plan and implement activities aimed at its implementation in the annex to the Belarusian Railways and Emergencies.
Requirements for special competencies	Ability to choose modern operating environments and information and communication technologies for informatization and automation of solution of applied tasks; perform computer simulation of devices, processes using universal packages of applied computer programs. The ability to use knowledge of basic physical theories to solve emerging fundamental and practical problems, to understand the principles of operation of devices, including those that go beyond the competence of a particular direction. Willingness to take into account modem trends in the development of electronics, measuring and computer technology, information technology in their professional activities.
Requirements for the readiness to change social, economic, professional roles, geographical and social mobility in the context of growing dynamism of changes and uncertainties:	Ability to navigate modem information flows and adapt to dynamically changing phenomena and processes in the global economy; knowledge of economic and organizational decision-making skills in an environment of uncertainty and risk. Ability for foreign-language professional intercultural communication, providing the ability to generate, interpret and operate on information in a foreign language; knowledge and ability to competently use professional vocabulary in their activities. Be flexible and mobile in various conditions and situations related to

	professional activities. Have economic and organizational decision-making skills in an environment of uncertainty and risk.

Head of the Department of Mechanical Engineering _____ **Nugman E.Z.**

Discussed at the meeting of the Department of Mechanical Engineering
Protocol No. 3 dated October 10, 2025