

## COOPERATION IN THE DEVELOPMENT OF CENTRIFUGAL PUMPS IN KAZAKHSTAN

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**Abstract.** *The Program's tasks: to carry out work to improve the technology for the development and design of pumping equipment; to carry out work on the introduction of modern high-tech CAD for the design of competitive pumping equipment; to carry out work on the development and implementation of digital technology and intelligent systems for organizing pumping equipment production to increase productivity.*

**Key words:** *Industry 4.0, centrifugal pumps, designing pumping, units CAD-machining, digital technologies.*

Kazakhstan has a great need for pumps used in priority sectors of the country: the oil and gas industry, the mining and metallurgical industry, the housing and communal services, the agro-industrial complex, etc. "Karlskrona LC AB" LLP is a local machinery factory that produces and sells pumps. The expansion range, product quality improvement, pumps efficiency increase, and achievement of science-intensive production level by the Industry 4.0 standard need research development and scientific and engineering support for technological innovations.

The production of CMP and ESP type pumps is carried out by "Nasosenergomash" Sumy Plant" JSC and "VNIIAEN" OJSC (All-Union Scientific Research Institute of Nuclear and Power Pump Building) operate in the field of design and production of pumping equipment (Ukraine). "Karlskrona LC AB" LLP has close contact with them to develop CP Engineering documentation.

Centrifugal pumps (referred to as CP) are designed for pumping various liquids, and gas-liquid mixtures and are widely used in multiple industries, as well as maintaining pressure in oil and uranium mining, transporting liquids through pipes, etc. In the design of pumping equipment, the methods of dynamic and hydrodynamic calculations of the shapes and operation of the blades, depending on the expected output parameters of the pump and increasing its efficiency, play a paramount role.

The development of methods capable of designing pumping units, taking into account the characteristics of technological cycles, and the modernization of pumps in operation for new operating modes, is an urgent task for energy and industry.

The development is based on modern knowledge of the dynamics of rotor systems, mechanisms, and computational fluid dynamics, and the method of designing impellers and guide vanes of the centrifugal pump, which makes it possible to create pumps with a high service life and efficiency with high reliability. The research is also based on the achievements of CAD-machining and Industry 4.0 digital technologies.

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## **СПІВПРАЦЯ В НАПРЯМКУ РОЗРОБКИ ВІДЦЕНТРОВИХ НАСОСІВ В КАЗАХСТАНІ**

**Анотація.** Наведено завдання Програми щодо проведення робіт з удосконалення технології розробки та проектування насосного обладнання; провести роботи з впровадження сучасних високотехнологічних САПР для проектування конкурентоспроможного насосного обладнання; провести роботи з розробки та впровадження цифрових технологій та інтелектуальних систем організації виробництва насосного обладнання для підвищення продуктивності.

**Ключові слова:** Індустрія 4.0, проектування насосів, САД-механічні агрегати, цифрові технології.

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