

**Name of project:** №AP09562459 «Creation of a prototype of a gear pump for agricultural machines based on a biaxial connection».

**Relevance:** Analysis of the current state of production and quality indicators of hydraulic machines in the conditions of machine-building industries and the agricultural industry of the Republic of Kazakhstan showed that the most common type of hydraulic machines is gear pumps (NSh), as well as domestic pumps and hydraulic machines, as a rule, do not correspond to international dimensions and parameters, do not have international quality certificates and an advanced maintenance system.

The results of the analysis also showed that there is a problem of ensuring the quality of production of the NS, as a result of which the NS do not always provide the required power, and the working parts of the NS wear out rather quickly, which leads to an unacceptable increase in leakage and a drop in the volumetric efficiency.

It was found that wear and tear of parts also occur at the initial stage of NSh operation. The reason for this may be an imperfect pump design, poor assembly and machining of parts.

Taking into account all the indicators of the analysis, we came to the conclusion that there is a problem in the design of the gear pump and its solution is to create a domestic high-performance gear pump design.

In this regard, the project aimed at solving the above problems is relevant.

**The purpose of the work:** increasing the productivity and quality of pumps of gear agricultural machines by using a new type of shaft-hole connection in the structure.

**Expected and achieved results:**

A prototype of a gear pump for agricultural machines based on a biaxial connection was made. In the future, it is planned to commercialize the resulting gear pump with a biaxial connection.

Based on the results of the project, it was published:

- 1 (one) article in a peer-reviewed scientific journal included in the Science Citation Index Expanded or Social Science Citation Index in the Web of Science database and (or) having a CiteScore percentile in the Scopus database of at least 35 (thirty five);

1. Research of the internal leakage process of a liquid in the design of a gear pump with a two-axial connection Research of the internal leakage process of a liquid in the design of a gear pump with a two-axial connection / News of the National Academy of Sciences of the Republic of Kazakhstan. Series of geology and technical sciences. 2021, Volume 2, Number 446 (2021), P.198-204. <https://doi.org/10.32014/2021.2518-170X.53> **Percentile-37%**.

2. Research of qualitative indicators of a gear pump with two-shaft connection for pumping petroleum products / News of the National Academy of Sciences of the Republic of Kazakhstan. Series of geology and technical sciences.

2021, Volume 4, Number 448 (2021), 108-116 <https://doi.org/10.32014/2021.2518-170X.88> **Percentile -37%**.

3. Research of the current state of production and quality indicators of hydraulic machines of agricultural machinery / Proceedings of the University. - Karaganda: Publishing house of KSTU, 2021.- №1 (82) - C.50-54.

4. Investigation of the deformed state of an elastic sliding element of a gear pump with a biaxial connection / Science and technology of Kazakhstan. - Pavlodar: Publishing house "KEREKU" PSU im. S. Toraigyrova, 2021.- No. 3 - P.31-37.

5. Eki stik kosylsya ie tistegerishty soryylardy zharatudyň ylymy neizderi. Monograph. Nur-Sultan: Printing house "Heipress", 2021 - 150s.

6. Gear pump with biaxial connection. Application for a patent of the RK for a utility model. Reg. No.2021 / 0992.2 dated 20.10.2021

7. Device for testing gear pumps based on a lathe // Patent of the Republic of Kazakhstan for a useful model No. 6641. Published 05.11. Bul. No. 44.

Based on the results of the study, recommendations were developed for the operation of a gear pump with a biaxial connection.

The target consumers of scientific products will be domestic agricultural and machine-building plants.

#### **Research team members:**

**Project Manager:** Sherov Aibek Karibekovich, PhD, Acting ass. professors. Hirsch index (h-index) - 3, profile (<https://www.scopus.com/authid/detail.uri?authorId=55338903500>).

Userbaev Muratbek Turarbekovich - candidate of technical sciences, position in the project - executive in charge. Hirsch index (h-index) - 1, profile (<https://www.scopus.com/authid/detail.uri?authorId=57203345192>).

Kuanov Isa Serikuly - master of technical sciences, doctoral student of KazATU named after S. Seifullin with a degree in Mechanics and Metalworking, position in the project - Junior Researcher. Hirsch index (h-index) - 1, profile (<https://www.scopus.com/authid/detail.uri?authorId=57215215845> ).

#### **Information for potential users:**

A domestic design of a gear pump for agricultural machines based on a biaxial connection has been developed. The proposed new NSh design with a biaxial connection allows for high productivity, efficiency, and is also affordable at cost.