NOVATEUR PUBLICATIONS
INTERNATIONAL JOURNAL OF INNOVATIONS IN ENGINEERING RESEARCH AND TECHNOLOGY
[IJIERT] ISSN: 2394-3696 Website: ijiert.org
VOLUME 9, ISSUE 9, Sep. -2022

THE SPECIFITY OF FORMA TION OF THE DISCIPLINE "THERY OF MECHANISMS AND MACHINES" AS A SEPARATE SCIENCE

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ANNOTATION
The basic stages of development of engineering thought that led to the formation of "theory of mechanisms and machines" as a science. Considered the period of the department "theory of mechanisms and machines" from theoretical mechanics, reasons, characteristics.

Keywords: Theory of mechanisms and machines, an independent science, history, reasons, features, International Federation for Theory of Machines and Mechanisms.

INTRODUCTION

The theory of mechanisms and machines (TMM) as a separate scientific discipline, before taking shape in an independent scientific direction, and then in an independent science, has come a rather long way of historical development and formation. An appropriate historical digression can serve as evidence of this.

The intellectual development of mankind from the very beginning of its existence and in all subsequent epochs was associated with the invention of various tools of labor, which, gradually becoming more complex, first took the form of all kinds of mechanisms, then primitive machines, which, evolving together with man, took on more and more perfect forms. It is customary to single out certain periods or stages in the development of engineering, which led to the formation of TMM as a science (table). Considering the table, you should stop at the 2nd and 3rd stages of development. It was during this period of time that the formation of TMM as an independent science and its final "branching" from theoretical mechanics took place.

However, first we note that the first attempts in this area were made by Leonardo da Vinci in the Renaissance (table, stage 1). Somewhat later, in his treatise “On the Dignity and Multiplication of the Sciences”, F. Bacon put forward the idea of “desirable sciences”, i.e. about sciences that did not yet exist at that time, but in which there was already a need. Among them he placed "the theory of machines". After a long pause, already in the 18th century, the theoretical works of J. Leipold (“Theater of Machines”) appeared, which, continuing the ideas of Leonardo da Vinci, singles out individual mechanisms, pays special attention to gears and gear reducers.

P.L. Chebyshev established an analytical relationship between the number of links and the number of kinematic pairs of mechanisms, that is, he gave the foundations for the structure of mechanisms. At the same time, the Russian scientist showed what a perfect and effective apparatus mathematics is in solving problems of analysis and synthesis of mechanisms. With the advent of the work of P.L. Chebyshev on mathematical methods of approximate synthesis of mechanisms (1853) is associated with the birth of a new science - the theory of mechanisms and machines, and the scientist himself is called the founder of the Russian school of TMM.

R. Willis compiled the most complete classification of mechanisms at that time. F. Reuleaux created mechanical models of mechanisms and their elements. In his encyclopedic work "Theoretical Kinematics", he also introduced such concepts as a kinematic pair, a kinematic chain and a kinematic scheme. After the publication of the works of R. Willis, P.L. Chebyshev, F. Reuleaux and a number of other scientists of the second half of the 19th century, one can confidently speak of the birth of a new science - the theory of mechanisms and machines, since thanks to these works, the scientific foundations of an independent science were created. It should be noted that an independent science has its own strict scientific systematics and classification of the objects under study. In addition, an independent science has in its arsenal methods for replacing a real physical object with one or another abstract mechanical model, close in its parameters to the physical nature of the object under study. Only an independent science is able to give a mathematical description of the model under consideration, which, in turn, makes it possible to conduct an analysis of the properties and phenomena of the created model with a certain certainty. Let us summarize the above, noting that any newly formed science takes a number of typical steps aimed at its further development and strengthening of its own positions. Any new science begins with the solution of a certain range of problems that cannot be solved by means of other sciences. Then the new science begins to streamline and classification of these problems. To this end, the new science develops theories, methods and techniques aimed at solving the problems facing it. These tasks can be conditionally called "external". In addition to them, there are also tasks, so to speak, “internal”, which include the tasks of the structure. Their solution is the basis for the existence and development of TMP. Note that all of the listed actions were successfully performed by TMM during the 2nd and 3rd stages of its development.

So, at the moment, TMM is a science that studies the structure or structure, kinematics and dynamics of mechanisms in connection with their analysis and synthesis. Its purpose: analysis and synthesis of typical mechanisms and systems. The goal forms the tasks of the TMM. The latter are expressed in the development of general methods for studying the structure, geometry, kinematics and dynamics of typical mechanisms and their systems.

In modern TMM, the following sections are distinguished: 1) analysis of mechanisms (structural, kinematic and dynamic), which means determining the properties of mechanisms according to a given scheme; 2) synthesis of mechanisms (structural, kinematic and dynamic) or design of mechanisms according to given properties; 3) the theory of automatic machines, including manipulators and industrial robots.

Having made sure that TMM acquired the status of an independent science in the middle of the 19th century, it is necessary to identify the reasons that contributed to this process. They have a pronounced objective nature and are the result of the actions of various laws of nature and society.

We have already mentioned above such a process as the accumulation of information. Any science goes through this period of accumulation of knowledge in its field. At the same time, they simultaneously expand and deepen. However, this process at a certain, more precise, critical moment changes its smooth course. A qualitative leap takes place, which in philosophy is called the manifestation of the dialectical law of the transition of quantitative changes into qualitative ones. During this period, science acquires a different quality, receiving all the parameters of independence, and the entire collected and to some extent scattered information array turns into a coherent system of knowledge. There is a differentiation of scientific knowledge. Such differentiation allows a more thorough and deep study of specific phenomena from the range of interests of a particular science. In addition, science is influenced by society, especially its historical development. Mankind has constantly sought to facilitate its existence by inventing and introducing into production all kinds of machines and mechanisms. In the early historical stages of development, such production was limited to small-scale batches of various products. The constant and steadily accelerating growth of industrial production also required better technical support, which ultimately

led to the industrial revolution of the 18th century. It served as an impetus for the development of science in general and technical sciences in particular. Indeed, any mechanism or machine cannot be designed without special knowledge. The demand for this knowledge creates the prerequisites for scientific research in the right direction. This somewhat schematic and simplified picture quite clearly reflects one of the natural reasons for the emergence of the theory of mechanisms and machines.

In conclusion, it should be noted that the disciplinary formalization of TMM as a science at the present time does not mean any stagnation either. On the contrary, the rigor and clarity of established scientific views and their successful practical application attract, for example, achievements in the field of cybernetics (computer design, simulation modeling). This shows modern integrative tendencies, when the classical scientific discipline attracts and enters into a viable symbiosis with a non-classical scientific discipline. This phenomenon brings mutual benefit and benefit to both sciences, and also opens up the broadest prospects for fruitful cooperation between different sciences. At the same time, TMM continues to be an important engineering science, providing the necessary basic engineering knowledge for specialists in various fields.

Under balancing, we can understand and interpret the task of dynamic synthesis of a mechanical separate spare part of the machine with the aim of the least reactions of the moving part of the machine to its specific rack by a more detailed arrangement of the masses of the moving links and, in addition, the introduced corrective masses. The main mechanisms of a general form include: cyclic mechanisms that implement the transformation of motion with a transfer function variable in the cycle. The main, in my opinion, the source of generation of variables and reactions that are significant in modulus are the forces and moments of inertia forces of links that perform non-inertial motion. The inertial sufficient or completely unused value of the strength of the links is not useful, is perceived by the connections, is transmitted to the rack (body link) and then to the frame and other systems of automotive equipment that support the working process of the machine, as well as to instrumentation, automatic control system and operator cars.

LIST OF USED LITERATURE

1. Bogolyubov A.N. The theory of mechanisms and machines in the historical development of its ideas. Moscow: Nauka, 1976.
2. Bagdasaryan N.G., Gorokhov V.G., Nazaretyan A.P. History, philosophy and methodology of science and technology: textbook and workshop for undergraduate and graduate students. Lyubertsy: Yurayt, 2016. 383 p.
3. History of mechanics from the end of the 18th to the middle of the 20th centuries. / resp. ed. A.T. Grigoryan, I.B. Pogrebyssky. Moscow: Nauka, 1972.
4. Truesdell K. Essays on the history of mechanics. M.: Izhevsk: Institute of Computer Research, 2002. 316 p.