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**CONCEPTION FOR THE DEVELOPMENT OF TRIBOLOGY IN
BULGARIA**

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Abstract

In 1987 the Laboratory of Tribology at the Technical University – Sofia, acting as a coordinating center for the country, developed and defended at national level “Conception for the development of Tribology in Bulgaria up to the year 2000”. As per the resolution of the management of the Society of the Bulgarian Tribologists a decision was taken this conception to be updated by means of additional appendices reflecting the development of tribology from conceptual point of view and for different periods of time.

In the present second edition of the Conception of 1987 was enriched for the period 2000 – 2004.

Initiator and leading author is Prof. DSc. Nyagol Manolov.

A significant result of the Conception was the entering of tribology in the Bulgarian classification of specialties with the code number 01.02.02.

I. Introduction

Tribology is a young interdisciplinary science of 40 years history, and has no quite clear idea about itself. Some scientists are satisfied by the concept of its multi-disciplinarity, other ones – with its interdisciplinarity, some ones regard on it as a section of the technical sciences, as complex mechanics, as a general technology, as a kind of art and way of thinking, etc. The popular is the concept of tribology as a science of friction – the literal translation of the notion.

Similar was the way of tribology in Bulgaria; beginning from friction as a contact force, passing through the interdisciplinary nature of tribology, up to the present day notion of the contact as a third ontological source of each wholeness. The up-to-date concept is: tribology is a science about contacts and contact interaction between elements in nature, society and techniques.

Bulgarian tribology was born on 01.12.1974 by the legalizing of the first national

laboratory of Tribology at the Department of Mechanics, the Technical University of Sofia initiated by Prof. DSc. N. Manolov.

In 1986 on a requirement of the Bulgarian government, initiated by Assoc. Prof. Dr. Ivan Damianov and Prof. DSc. N. Manolov, the Coordinating Center of Tribology at the Technical University – Sofia had to develop the following materials:

1. Technical-Economical Report on the development of Tribology in Bulgaria up to the year 2000.

2. Project for the organizational structures for the further development of tribology in the country.

3. Project for the preparation of specialists in tribology in Bulgaria.

In pursuance of this order was developed and defended the “Conception for the Development of Tribology in Bulgaria up to the year 2000” under the guidance of Prof. N. Manolov, with the active participation of Assoc. Prof. Dr. E. Assenova and Assist. Prof. Dr. M. Kandeва.

As per the resolution of the management of the Society of the Bulgarian Tribologists a decision was taken this conception to be updated by means of additional appendices reflecting the development of tribology from conceptual point of view and for different periods of time.

In 2005 was published the second edition of the Conception with the addition for the period 2000 – 2004.

The presentation here aims to follow the ideas and models in the Bulgarian tribology in the spirit of the interdisciplinary sciences, technologies, and the world trends.

II. Expose

As widely known, a **scientific object** is every detached wholeness in its space, time or function, which is expressed permanently and significantly for humanity and/or for its societies. For example, the object of metal science is metals, of anthropology – human being, etc. And of tribology? The widely used answer is: Friction, wear, lubrication of bodies and machines.

This answer is orthodox as character and cannot satisfy our queries. At least, because friction in machines does not belong to separate objects, but is a manifestation of their relationships. So it is missing or underestimated the special and temporal formation, which is formed between bodies, and where all these processes take place. This formation is called by tribologists **contact (third) body**, which should be declared as object of tribology.

Hence, tribology is a science studying contacts as substrate, structure and dynamics, which cause the processes of friction, wear and lubrication, and many other phenomena of the contact interactions.

With the lack of clearly determined object could be explained the relatively long period for tribology to prove its rights of own scientific statute.

The specific for **contact** as scientific object of tribology is that it cannot be separated from the contacting bodies, which form it, and the way this “body” can be characterized as **functional body**. This characteristic of the functional contact explains the fact that either friction, nor wear, or any other contact phenomenon, has to be connected

with only one of the partner bodies in the contact interaction.

In bibliography the notions of **contact** and **contact interactions** are used, in general always in the shadow of friction, particularly when the subject or the object of tribology are dealt with. The widely spread idea, here, is the contact body to be regarded as “zone of frictional interactions of bodies”, i. e. the basic notion is friction, and contact, as a zone, is its appendage.

The proposed here metamorphosis is in the exchange of the positions of these notions launching the notion **contact** in the rank of a general-scientific interdisciplinary notion, and friction – as its manifestation, one of its various characteristics.

Contact in its most general scientific dimension is transformed in the third ontological **inception**, realizing the universal connection between independent existing elements of the being.

Contact is identified by the specific mechanisms of generation, destruction and admission of material, energetic and informational flows.

Contact is that real object with its physical, social and spiritual dimension, which makes the world unified, various and sustainable, and the elements and systems of the being – open to each other.

Not all formations of the being can form functional contacts, but only those, which are supplementary, i. e. those which are **alternatives** in the given functional cross-section.

The differentiation of contact as object of tribology, and in broader sense – as third ontological beginning, will result to the change of the dominating in analysis and synthesis binary relations, by triads and triadic structures. The bipolar (alternative) atom as elemental model of the being, will be replaced by the triunique model of the functional atom consisting of two alternatives and the contact between them.

The contact as common formation between two alternatives is not only their copy, but also their creative manifestation.

In a generalized manner we can conclude that the role of contacts comes down to **three fundamental functions** for each wholeness of the being: to divide, to unify and to realize the sustainability of the triunique functional atom.

It is paradoxical that there are doubts in the existence of contacts between the alternatives of the functional atom, some more, that in practice the unique proof for the being of alternatives is the contact itself, and the contact interactions. In this relation, the centre of science should be displaced from the alternatives to their boundary contact formations. The basic failures, diseases and crises in all systems of the being are concentrated and provoke pathological states of their contact formations.

Is there any difference between the third body of tribology and the third ontological beginning in the functional atom? Yes. **The difference** is that the **third contact body** is localized between two alternatives, and the **third beginning** unifies in one the contact body of the system of internal contacts of the alternatives (contact networks). In this sense the third body is **the kernel** of the **third beginning**. Through the systems of **contact networks** the third beginning is present in the functional space of the whole system. So the third beginning realizes principally new formula in the functioning of the system, according to which the elements of the functional atom of the system are not only one to each other, but they form one after each and realize themselves by their functional behavior one in each other. Through the third beginning, the idea for the contact body ensures the presence of the functional atom in the whole space of the being.

Now the most important question related to the object of tribology:

How the contact as a separate object will enrich tribology and science in general?

In a generalized form, the answer is: by the **new tribological paradigm**. More particular this means: by the new triunique model for the elemental contact system comprising two alternatives and contact between them. Analysis and synthesis of arbitrary contact systems are realized on the base of the model of triunique elemental contact system, which is the prototype of the idea for the universal **functional atom of the being**.

1. Introducing contact and contact beginning in the components of each functional atom as basic model will provoke the necessity of new notions in tribology and formation of new principles based on this model and a general approach for the contact interaction between functional atoms for any contact system. Model, notions, principles and law guarantee the sustainability of tribology as an interdisciplinary science with its own paradigm.

Laying contacts in the center of the study in the investigation, description and dissemination of scientific information in tribology means that tribology would overcome its chaotic character as a mechanical sum of methods, devices and results.

2. Tribology as a science of contacts in nature, society and techniques will obtain new statute of **basic interdisciplinary science**. All interdisciplinary sciences are sciences at the boundary, because they study phenomena of the interaction in the frontier between two and more sciences. Tribology is, however, the only one among them to be a contact (boundary) science dealing directly with the study of contacts in all their varieties.

3. Contacts as object of tribology in broader sense as third ontological beginning of the being and all its functional atoms corresponding to things, processes and phenomena will lead to a wider popularity and fundamental importance of tribological paradigm for the human culture in politics and practice, in the period of intellectual crisis and the corresponding globalization.

4. The new paradigm of tribology парадигма and its actual contents in the problems of contact interactions, friction, wear, lubrication, at macro and microlevel, will reveal possibilities for more compact and logical presentation in the tutorial and methodological space, aiming more adequate place in the university education.

III. Conclusion

1. In relation of the development of Conception for the development of tribology in Bulgaria have been proposed new tribological notions: principles of tribology, general law of tribology, trialism, contact networks, contact zero, functional atom, alternatives, contact approach, etc.

2. The principles of tribology and the general law of the contact interaction in tribology allow unified approach on macro- and microlevel in the analysis of tribological phenomena and

relationships. In the post-modern world Tribology has to take the place, which was occupied by mechanics in the industrial world as methodological sample for the rest of sciences.

3. Object, principles, general law, contact approach and the idea for the functional atom are notions and models, which will transform tribology in a fundamental interdisciplinary science – basis for new global consciousness, common global order and sustainable development of the world.

References

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