



# For an unified and correct IFToMM terminology in the area of gearing

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## Abstract

The presentation of this paper is provoked by the fact that in such a huge class of gear trains, as gear trains with mobile axes of gears, there is no definite agreement in the use of terms in different languages and sometimes even in one language. Therefore it is very important to establish a logical, correct, explicit and unambiguous terminology that could help facilitate intensive contacts and interchange of knowledge and technologies among different countries in the time of rapid globalization of the world.

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## 1. Introduction

The present-day intensive contacts and interchange of knowledge and technologies among different countries requires further standardization of terminology and unification of symbolic used by scientists and engineers. That is the reason why such international organizations as IFToMM

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[1–3], ISO [4,5], and other standard issuing organizations [6–10] engage people, spend time and money for the development of a unified and correct terminology and symbolic as an important communication tool in the area of science and technique.

Gears are a wide spread mechanical components. They are the widely spread mechanical components. One can hardly find a conventional machine without gears in it. Even gear is the symbol of the whole technique. The presentation of this paper is provoked by the fact that in such a huge class of gear trains, as gear trains with mobile axes of gears, there is no definite agreement in the use of terms in different languages—as it could be observed from the IFToMM terminology, published in 1991 [2]:

- in English: *Epicyclic (Planetary) Gear (Train)*;
- in French: *Train epicycloidal*;
- in German: *Planetenrädergetriebe, Umlaufträgergetriebe*;
- in Russian: *Эпициклический (планетарный) механизм*

Different languages use different terms to denote all this class of gear trains: some call them *planetary gear trains*, while others prefer *epicyclic gear trains*. Moreover, whereas in some countries the term *epicyclic gear trains* is not in use at all [2,7], in others both terms are in use [2,6,11–14], in third group of countries this term (*epicyclic gear trains*) is applied to all trains of the wide class trains mentioned above and according to the degree of freedom they are divided into *planetary gear trains* and *differential gear trains* [15]. Such a separation of trains with mobile axes of gears in planetary and differential as different in principle trains and their treatment as not belonging to one and the same class of trains seems confusing. Moreover, in several cases, different terms are used to denote one class of trains: for instance, while some authors call them trains, others prefer mechanisms [10]. As a matter of fact, everything in machine technique including trains is a mechanism [16–18]—therefore, the differentiation between trains and mechanisms does not seem well grounded.

Thus, the authors feel that in the field of machine technique, a necessity exists to reach general conventions on a standard, consistent and non-contradictory terminology [19].

The use of correct terminology is particularly important for the university discipline “Theory of Mechanisms and Machines” (somewhere “Kinematics and Dynamics of Machines”) which could be considered as a first course which starts introducing engineering terms and these terms, correct or wrong, are used after that in following university disciplines. It is IFToMM as an international organization which mission is to unify scientists from “Theory of Mechanisms and Machines” that should take the obligation of establishment of the most proper terminology and of elimination of wrong terms as it is mentioned in [1]. The present paper is dealing with some of these problematic terms.

## 2. Planet or epicyclic gear trains?

It could be supposed that the term “*epicyclic gear trains*” was introduced in science before the internal gearing had been invented. Such train is shown in Fig. 1a and certainly there were good reasons to be called *epicyclic gear trains*. When the cutting of internally toothed gears became fea-

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