

From TMM to MMS: a Vision of IFToMM

TMM (Theory of Machines and Mechanisms) can be considered established as a modern discipline with the foundation of Ecole Polytechnique in Paris in 1794, as Gaspard Monge (1746-1818) proposed to include lectures on mechanism analysis in the course of Descriptive Geometry. Although he never gave those classes, he inspired and supervised to some extent the work of his pupils, who published the milestone works that can be considered the beginning of TMM:

Lanz J.M. and Betancourt A. , 1808, "Essai sur la composition des machines", Paris.

Hachette J.N.P. , 1811, "Traité élémentaire des machines", Paris.

In 1834 André Marie Ampère (1775-1836) coined the word Kinematics to address the discipline treating the motion of rigid bodies without considering the actions that cause it. Soon everywhere in Europe the early established Schools of Engineering included courses on TMM and/or Kinematics of Mechanisms in the engineering curriculum. Consequently, in the second half of XIXth century the so-called Golden Age of TMM has been experienced with a considerable evolution of TMM from descriptive-geometrical approaches to rigorous formulations of the acquired knowledge on Kinematics of mechanisms, giving a great success in the application of mechanism design in all aspects of Engineering.

Thus, at the end of XIXth century, TMM has been well established in the Industrialized World, and several recognized personalities published fundamental works, on which the modern TMM is based, as for example Robert Willis in 1841, Carlo Giulio in 1846, Haton de la Goullepierre in 1864, Franz Reuleaux in 1875, Ludwig Burmester in 1888, Lorenzo Allievi in 1895, and Pafnutii L'vovich Chebyshev in 1899, to cite some.

In the first half of XXIth century Mechanical Engineering showed impressive results in advancing the state of Technology, and everywhere in the Schools of Engineering TMM was taught as a fundamental and applied discipline.

The world-wide interest on TMM led also to an internationalizing process of the field that needed more and more exchange of experience and knowledge among researchers around the world. The modern significance of TMM found its expression at the international institutional level with the foundation of the International Federation for the Theory of Machines and Mechanisms (IFToMM) in 1969, Fig.1. The history of IFToMM has been outlined by the past IFToMM Presidents themselves in Chapter 2 of the Proceedings of HMM2000 -International Symposium on History of Machines and Mechanisms (published by Kluwer).



Fig.1 A historical moment of the foundation of IFToMM, the International Federation for the Theory of Machines and Mechanisms, in Zakopane (Poland) on 27 September 1969, (Courtesy of the IFToMM Archives) in which one can recognize: 1- prof. Ivan Ivanovich Artobolevskii (USSR); 2- prof. Adam Morecki (Poland); 5- prof. Nicolae I. Manolescu (Romania); 6- prof. Erskine F. Crossley (USA); 7- prof. Giovanni Bianchi (Italy); 8- prof. Aron E. Kobrinskii (USSR); 9- prof. Werner Thomas (USA); 10- prof. Jan Oderfeld (Poland).

The advent of computers pushed great changes in Engineering by enabling the engineers to work with numerical simulations, thereby overcoming the traditional geometric methods and even experimental activity.

Thus, starting from the 1960's TMM lost somehow the fundamental content of Theory that can be understood as both theoretical investigation and experimental practice of mechanisms (for more details on the meaning of TMM see the article "On the meaning of TMM over time" in the 1999 Bulletin IFToMM Newsletter, Vol.8. No.1). Today most of the work and research on mechanisms is carried out through the use of computer-oriented approaches, even in the renewed experimental studies. In addition, in the last decades new fields of expertise and applications have enlarged considerably the field of TMM by including other engineering aspects that involve not only mechanisms, so that recently the IFToMM Community felt the need to even up-date the name of the discipline. After a long discussion, the

term MMS (Machine and Mechanism Science) was accepted in order to give a wide meaning of the wideness that today's mechanisms discipline has reached. Thus, in 2000 even IFToMM Federation was renamed as IFToMM, the International Federation for the Promotion of Mechanism and Machine Science, while keeping its historical identity with the IFToMM name.

At the beginning of the third millennium IFToMM can be presented as a fundamental institution for the future success of MMS all around the world. This is because IFToMM offers a common framework for the many aspects of MMS as innovation, research, teaching, cooperation, etc., since it is the most important frame of reference and source of activity information in the field of MMS at large and in specific subjects.

But, facing the needs and requirements of a successful future, the IFToMM community should be able to re-shape some of its fundamental behavior, scope and organization. IFToMM was established as an international institution mainly to link TMM activities in Eastern and Western countries with the aim of exchanging experiences and promoting collaboration among region Societies or Associations. Not only will the collaboration among region entities (that are the members of IFToMM) be fundamental for the future success of IFToMM, but the activity of individuals of the IFToMM Community will be necessary to re-establish the importance of the field and the community yet. This means a different vision of IFToMM that will act on individuals base. Therefore, IFToMM should be re-shaped to give more flexibility and acceptance to the activity of individuals, since the over-nationality process will vanish the differences from country to country, from national society to national society, as already we have started to experience.

Personally I think that the main changes that IFToMM will experience lie in the following, always preserving the historical identity of IFToMM, with innovative approaches:

- to facilitate the circulation and enlargement of IFToMM activities;
- to give and promote the activity of individuals of the IFToMM community.

The above-mentioned features in a more flexible organization may also call for to a higher efficiency that will require greater resources in terms of both financial and technical means. In particular, IFToMM should be organized as a non-profit organization yet, but able to find the necessary funds to promote more and more activities that should be even the source of financial revenue. This aspect will require a stronger promotion activity that should be carried out by each individual in the IFToMM community. Many other disciplines and related international Societies have been established recently, and even more organizations will be founded in the future, so that IFToMM should be able to promote itself, since the time that everyone recognizes the importance of MMS and IFToMM is already over because of the great competition even among the various associations.

Another relevant change to be addressed is the publication and subscription of the Mechanism and Machine Theory (MMT), the official IFToMM Journal. The goal of the IFToMM journal should be a world-wide circulation of the works done by the IFToMM community. Thus, more and more pages, more and more issues, quicker and quicker reviews, and rapid publication of accepted papers are needed. In addition, electronic publications should be started, like the promising Electronic Journal on Computational Kinematics (EJCK). But, primarily the subscription rule should be changed in the sense that subscription of individuals should be accepted and encouraged without requiring a very expensive institutional subscription. A wide circulation of the journal can be achieved when individuals can subscribe to MMT. In addition, similarly to other engineers organizations, IFToMM should draw financial benefit from the subscription revenue yet.

A fundamental evolution of IFToMM behavior can be recognized in a more active participation of individuals, mainly but not restricted to the established Commissions and Committees. Today most of the work is on charge of the Chairs of the Technical Committees and Permanent Commissions (TCs and PCs). In the future TCs and PCs will work with many members, who are representatives of all the IFToMM members, so that the TCs and PCs will be active at the international but also at the national/regional levels.

Summarizing, the future success of MMS as a Science will require to open the doors to the scientific community at large, but individuals of the IFToMM community should be the cornerstones of a great building. Thus, MMS and particularly the IFToMM community will enhance successfully Technology like in the past and will serve the Society by achieving a better quality of the environment and human life.

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