Editorial Activity of the IFToMM-PC for the History of Mechanism and Machine Science in the Period 2018–2023

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Abstract. The mandate of the current steering committee of the IFToMM Permanent Commission for the History of Mechanism and Machine Science (PC-HMMS) ends in 2023, after two consecutive terms. This paper is aimed at summarizes the activities and results of the PC-HMMS by all its members in these six years (2018–2023). It is intended to be a brief final report - the first to date - to constantly monitor the state of health of the commission. In particular, the focus is on the editorial activity of the PC that has been developed on two main tracks: the publication of monographs and related books on HMMS, and the publication of the proceedings of conferences and workshops related to the HMMS topics. The paper, without claims of completeness, is intended to be a moment of reflection on what has been done and a starting point for the activity of the next board of the IFToMM PC-HMMS.

Keywords: History of IFToMM · History of MMS · History of IFToMM Permanent Commission for History of MMS · HMM Symposium · Book series on History of MMS

1 Introduction

According to [1], the history of the IFToMM Permanent Commission (PC) for the History of Mechanism and Machine Science (HMMS) has developed on three main phases. The first one (1972–1985) was the pioneering phase of gathering of interest over the project and the initiation of the PC as a formal structure of the IFToMM, thanks to the pioneering vision of Jack Phillips. The second phase (1986–2000) was mainly devoted to the grow of the community interested in the history of engineering and science. Full maturity was reached starting from the new century with the third phase (2000-today) thanks to a far-sighted intuition of Marco Ceccarelli who started the first edition of the Symposium of HMM, establishing a specific international congress for the commission on regular basis. The success of the HMM symposiums paved the way for a fruitful collaboration with

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Springer, the international publisher of the proceedings. Springer accepted the proposal of book series completely devoted to the HMM, including the symposia proceedings but also monographs. To date the series counts more than 46 publications, divided upon 40 monographs and 6 proceedings of thematic conferences. The series is consistently among the most-successful one of the publisher, confirming the public's interest in topics related to the history of mechanisms.

Table 1 lists the chairs of the PC-HMMS from the beginning to date. During the next HMM symposium, which will be held in Ankara (Turkey) in 2024, there will be votes for the next board of the PC who will remain in charge for the next three years. The aim of this paper is to retrace the activities of the members of the commission in the last six years, i.e. of the outgoing board, as a moment of reflection on what has been done, the state of health of our PC-HMMS and what the future prospects may be.

Table 1. List of the chairs of the PC-HMMS in the period 1972–2023

Chair of the PC HMMS	Period	Country
Jack Phillips	1972–1981	Australia
Elisabeth Filemon	1982–1990	Hungary
Teun Koetsier	1991–1997	The Netherlands
Marco Ceccarelli	1998–2002	Italy
Hong-Sen Yan	2003–2006	China-Taipei
Hanfried Kerle	2007–2010	Germany
Thomas Chondros	2010–2013	Greece
Olga Egorova	2014–2017	Russia
Alessandro Gasparetto	2018–2023	Italy

2 HMM: International Symposium on History of Machines and Mechanisms

The IFToMM Symposium on the History of Machines and Mechanisms (IFToMM-HMM) was started in 2000 in Cassino [2], Italy by the then chairman of the permanent commission Marco Ceccarelli, with the intent to collect the increasingly numerous works in the HMM field that were presented at more generalist conferences. As detailed in a previous paper on PC-HMMSA [3], after two editions held in Cassino the symposium became more structured with a quadrennial periodicity and started to be hosted by different Universities in the world. The proceedings are edited by Springer in the series titled History of Mechanism and Machine Science [4] as reported in Fig. 1.

In the last 6 years (2018 – 2023) only two editions took place:

- The 6th International Symposium on History of Machines and Mechanisms (HMM 2018). September 26–28, 2018 – Beijing (China)

- The 7th International Symposium on History of Machines and Mechanisms (HMM 2022). April 28–30, 2022 – Granada-Jaén (Spain)

The 2020 edition scheduled in Granada-Jaén was postponed to 2022 due to the COVID pandemic.

The proceedings book of the HMM 2018 [5] is edited by Baichun Zhang of the Institute for the History of Natural Sciences, Chinese Academy of Sciences, Beijing, China, and Marco Ceccarelli, University of Rome Tor Vergata, Rome, Italy. The conference registered 27 contributions from 10 countries as listed in Table 2.

Table 2. Papers submitted to the HMM 2018 symposium in Beijing, China [5]

Section	Papers	Country (corresponding author)
Engineers and Their Stories	6	Turkey (1), Italy (1), China (3), Poland (1)
History of machine design	8	India (2), Mexico (1), China (1), Taiwan (1), Italy (2)
Ancient mechanisms	6	Italy (3), China (1), Spain (1), Turkey (1)
History of modern technology	7	China (3), Italy (2), The Netherlands (1), Brasil (1)

The proceedings book of the HMM 2022 [6] is edited by Rafael López-García of the Department of Mechanic and Mining Engineering, University of Jaén, Jaén, Spain, and Marco Ceccarelli, University of Rome Tor Vergata, Rome, Italy. The conference registered 39 contributions from 12 countries as listed in Table 3.

Table 3. Papers submitted to the HMM 2022 symposium in Granada-Jaén, Spain [6]

Section	Papers	Country (corresponding author)
Past PC Distinguished Figures and People	6	Italy (2), Russia (1), Spain (1), Turkey (1), USA (1)
Modern Reviews of Past Works	6	Russia (1), Spain (3), Taiwan (1), Italy (1)
History of the Design of Machines and Mechanisms	6	Spain (5), Serbia (1)
Historic Development of Theories and Teaching	5	France (1), Brazil (1), India (1), Spain (1), The Netherlands (1)
Representation, Encoding and Geometry of Machines and Mechanisms	4	Italy (4)
Developments of Mechanical Design and Automation	6	Italy (3), Russia (1), Mexico (1), Turkey (1)
Past Iberoamerican Distinguished Figures, Experiences and Designs in MMS	6	Spain (5), Mexico (1)

Most of the contributions are produced by members of the PC-HMMS, even with collaborations among them, from different countries. In addition, the symposium is

successful in attracting interest (for attendance and contributions) by also historian from other community than IFToMM.

a) b)

Fig. 1. Front pages of the Proceedings: a) in 2018, [5]; b) in 2022, [6] edition of the IFToMM Symposium on History of Machines and Mechanisms.

3 Local IFToMM Conferences

In addition to conferences organized at permanent committee level, such as the symposium, specific sessions on the history of mechanisms are offered within other conferences like those ones organized by a member organization of the IFToMM. As an example, can refer to IFToMM Italy whose biennial conference includes session on history of MMS. In the last six years IFToMM Italy organized three editions of its biennial international conference [7–9]. During this period, a new series of conferences started focused on the EU' sustainable development goals, sponsored by IFToMM and organized by IFToMM Italy. The first I4SDG (IFToMM for Sustainable Development Goals) workshop was held online (November 25–26, 2021) [10].

Table 4 collects information about the special sessions organized with the support of the PC-HMMS. In brackets the number of papers presented at the conference or at the special session, while the last column refers to the nationality of the affiliation of the corresponding author. All the proceedings have been published by Springer in the dedicated book series on Mechanisms and Machine Science, [3]. The front page of all these volumes are reported in Fig. 2.

It is to be noted that in addition to other member organizations' conferences, many other IFToMM sponsored conferences have organized sessions on history of MMS within their program with a special focus on the corresponding.

Table 4. Conferences organized by IFToMM Italy that included a special session on the History of Mechanisms and Machine. In brackets the number of papers.

Conference (# of papers)	Special session (# of papers)	Country of the corresponding author
2° IFToMM Italy (57)	History of MMS and Kinematics (4)	Italy (3), Kazakhstan (1)
3° IFToMM Italy (98)	History of Mechanism Science (9)	Italy (7), Russia (1), Brazil (1)
1° I4SDG Workshop (69)	History of Mechanism and Machine Science, Education (9)	The Netherlands (1), Russia (1), Italy (4), Turkey (1), Lebanon (1), China (1)
3° IFToMM Italy (105)	History of Mechanism Science (4)	Italy (4)

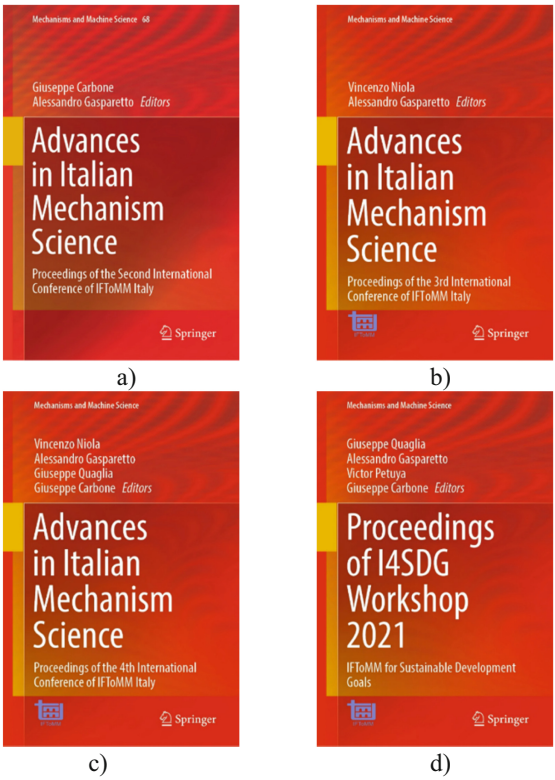

Fig. 2. Front pages of the Proceedings of the conferences organized or by IFToMM Italy: a) 2nd IFIT in 2018 [7], b) 3rd IFIT in 2020 [8], c) 3rd IFIT in 2022 [9], d) 1st I4SDG in 2021 [10].

4 Book Series on History of Mechanism and Machine Science

In 2007, the IFToMM PC for the History of Mechanism and Machine Science started a book series edited by Springer on "History of Mechanism and Machine Science" (ISBN 1875-3442) [3], whose scientific editor is Marco Ceccarelli (University of Rome, Italy). The series publishes works that give an overview of the historical developments, from the earliest times up to and including the recent past, as referring to Mechanism and Machine Science in all its technical aspects, including monographs and edited books. In the period 2018–2023, four volumes have been published as listed in Table 5. It is to note that those volumes are authored not only by PC-HMMS members, like for example those by Capecchi and Channel.

Table 5. Publications in the History of Mechanism and Machine Science series in the period 2018–2023, Fig. 3.

Year	Authors	Title	Authors' affiliation
2018	D. Capecchi	The Path to Post-Galilean Epistemology. Reinterpreting the Birth of Modern Science [11]	La Sapienza University of Rome, Rome, Italy
2019	D.F. Channell	The Rise of Engineering Science. How Technology Became Scientific [12]	The University of Texas at Dallas, Richardson, USA
2019	T. Koetsier	The Ascent of GIM, the Global Intelligent Machine. A History of Production and Information Machines [13]	VU University, Amsterdam, The Netherlands
2021	D. Capecchi	Epistemology and Natural Philosophy in the 18th Century. The Roots of Modern Physics [14]	La Sapienza University of Rome, Rome, Italy
2023	D. Banabic	History of Romanian Technology and Industry Volume 2: Electrical Engineering, Energetics, Transport and Technology Education, [15] (Volume 1: Mechanics, Processing Techniques and Construction published at the beginning of 2024)	Technical University of Cluj Napoca, Cluj Napoca, Romania
2023	T. Koetsier	A History of Kinematics from Zeno to Einstein On the Role of Motion in the Development of Mathematics [16]	VU University, Amsterdam, The Netherlands

In The Path to Post-Galilean Epistemology. Reinterpreting the Birth of Modern Science (2018) [11], Danilo Capecchi focuses on the process that in the sixteenth and seventeenth centuries led to a profound transformation in the study of nature with the

emergence of mechanistic philosophy and the establishment of the experimental approach, arguing that modern European science originated from Hellenistic mathematics not so much because of rediscovery of the latter but rather because its "applied" components (e.g. mechanics, optics, harmonics, and astronomy) and their methodologies continued to be transmitted throughout the Middle Ages without serious interruption. The role of mathematicians is stressed over that of philosophers of nature and the focus is particularly on epistemological aspects. In the Book series Danilo Capecchi published also Epistemology and Natural Philosophy in the 18th Century. The Roots of Modern Physics (2021) [14].

In The Rise of Engineering Science. How Technology Became Scientific (2019) [12], David F. Channell analyzes how the Scientific Revolution of the 16th and 17th centuries, and the Industrial Revolution of the 18th and 19th centuries provided the intellectual, social, economic and institutional foundations for the emergence of engineering science, leading to new technological developments that have come to shape our modern world.

In The Ascent of GIM, the Global Intelligent Machine. A History of Production and Information Machines (2019) [13], Teun Koetsier discusses the development of machines from the Stone Age until the present and pays particular attention to the rise of the science of machines and the development of the relationship between science and technology. The author finally introduces the concept of Global Intelligent Machine (GIM), which is a huge global hybrid machine, a combination of production machinery, information machinery and mechanized networks.

In Epistemology and Natural Philosophy in the 18th Century. The Roots of Modern Physics (2021) [14], Danilo Capecchi documents the process of transformation from natural philosophy into modern disciplines such as mathematics, physics, natural history, chemistry, medicine and engineering. It focuses on the 18th century, which has often been considered uninteresting for the history of science, representing the transition from the age of genius and the birth of modern science (the 17th century) to the age of prodigious development in the 19th century, and it was characterized by substantial ferment and novelty.

In History of Romanian Technology and Industry, Volume 2: Electrical Engineering, Energetics, Transport and Technology Education, [15] (Volume 1: Mechanics, Processing Techniques and Construction published at the beginning of 2024) several Romania authors outline an historical perspective of the valuable achievements of the Romanian technology and industry worldwide. In general, the history of Romanian technique is poorly known outside Romania. This second volume of the 2-book set discusses aspects of engineering societies, engineering education, intellectual property, referring also to Romanian figures mainly in the fields of electrical engineering, energy technology, biomedicine, maritime and rail transport, automotive industry, and aviation. Volume 1: Mechanics, Processing Techniques and Construction will be published in 2024 dealing with industry achievements in mining, metallurgy, oil, natural gas, machine building, agricultural machinery, military, textiles, and construction. Folk technology, the formation of the industrial system, and mechanics are also described in separate chapters.

Fig. 3. Monographs on the history of MMS published in the period 2018–2023. See references: a) [11], b) [12], c) [13], d) [15], e) [16], f) [17]

The new book by Teun Koetsier on A History of Kinematics from Zeno to Einstein, [16], discusses the history of kinematics from the Greeks to the 20th century. It shows that the subject has its roots in geometry, mechanics and mechanical engineering and how it became in the 19th century a coherent field of research, for which Ampère coined the name kinematics. The story starts with the important Greek tradition of solving construction problems by means of kinematically defined curves and the use of kinematical models in Greek astronomy. As a result, in 17th century mathematics motion played a crucial role as well, and the book pays ample attention to it. It is also discussed how the concept of instantaneous velocity, unknown to the Greeks, was introduced in the late Middle Ages and how in the 18th century, when classical mechanics was formed, kinematical theorems concerning the distribution of velocity in a solid body moving in space were proved. The book shows that in the 19th century, against the background of the industrial revolution, the theory of machines and thus the kinematics of mechanisms received a great attention.

In Fig. 3 is included also mention to the book State-of-the-Art and Innovations in Mechanism and Machine Science: A Tribute to Carlos López-Cajún, [17], as a significant publication both of the link to the other IFToMM affiliated book series on MMS and to a historical-technical tribute of the PC member Carlos López-Cajún, who was a leading IFToMMist in MMS fields and IFToMM activities. This book collects invited contributions as survey and research reports in mechanism and machine science (MMS) mainly in fields that were of interest to late Prof. Carlos López Cajún.

4.1 Distinguished Figures in Mechanism and Machine Science

Among the books published in the HMMS, it is to note a series on the Distinguished Figures in Mechanism and Machine Science as dedicated to the past MMS, namely on mechanical engineering that are of interest for MMS.

In the period 2018–2023 Springer edited two volumes: part 4 [18] and part 5 [19], and a specific volume dedicated to the mechanical engineers in Spain and Ibero-America [20]. Table 6 lists the people in those volumes, while the front pages are shown in Fig. 4.

a) b) c)

Fig. 4. Front pages of the Distinguished Figures in MMS books: a) Part 4 [18], b) part 5 [19], c) Special volume on Spanish and Ibero-American contributions [20].

Table 6. List of the volumes and figures from the Springer series: Distinguished Figures in Mechanism and Machine Science (2018–2023)

Volume	Figures
2020, Distinguished Figures in Mechanism and Machine Science. Their Contributions and Legacies, Part 4 [18] Editors: Marco Ceccarelli, Yibing Fang	Ma Jun (the 3rd Century AD) Homer (c.800-c.701 BCE) Francesco di Giorgio (1439–1501) Taqui al Din (1521–1585) Jacques de Vaucanson (1709–1782) Xu Baosheng (1912–2007) Giovanni Bianchi (1924–2003) Alexander Alexandrovich Golovin (1939–2013) Cesare Rossi (1955–2017)
2023, Distinguished Figures in Mechanism and Machine Science. Legacy and Contribution of the IFToMM Community, Part 5 [19] Editors: Marco Ceccarelli, Alessandro Gasparetto	The Founding Fathers of IFToMM Jack Raymond Phillips (1923–2009) Teru Hayashi (1932–2017) Andrew D. Dimarogonas (1938–2000) Alberto Rovetta (1940–2020) Veniamin Goldfarb (1941–2019) Calos Lopez-Cajun (1948–2020)
2023, Distinguished Figures in Mechanical Engineering in Spain and Ibero-America [20] Editors: Rafael López-García, Marco Ceccarelli	The Yeregui family (18th-Twentieth Century) Jose Joaquin Romero de Landa (1735–1807) Tomas de Morla y Pacheco (1747–1811) Carlo Filangieri (1784–1867) Cipriano Segundo Montesino y Estrada (1817–1901) José Ruiz-Castizo (1857–1929) Guillermo Quintanilla y Fabregas (1867–1929) Alejandro Goicoechea Omar (1895–1984) Eduardo Barreiros (1919–1992) Rafael Escola Gil (1919–1997) Domingo Santo Liotta (1924–2022) Patricio A.A. Laura Casas (1935–2006) Eduardo Giro Barella (1940-Present) Gilda Sara Fernandez Levy (1944–1994) Leonardo Torres Quevedo (1952–1936)

5 Conclusions

In this paper, the activity carried out by the IFToMM Permanent Commission for History of MMS in the last six years has been described. In particular, the editorial activities of the PC have been analyzed, namely the publication of monographs and proceedings of conferences, workshops and symposia on topics related to history of MMS.

This analysis can bring to some reflections and considerations. In particular, it should be emphasized that major challenges must be faced by the IFToMM PC for History of

MMS in the future. Despite the success of the PC in the years, due mainly to the presence of a strong core of researchers deeply interested in historical issues, and to the existence of consolidated events (e.g. the HMM Symposium) and of scientifically relevant publications (e.g. the Springer series), the PC will have to renovate its composition by adding some new young researchers, since the age of many members is over 60, and these members will retire soon.

This goal could be accomplished also by involving young researchers not only from Engineering discipline, but also from Humanities. This would create an interdisciplinary environment where researchers of different background could collaborate and carry out joint activities, that could enrich the Permanent Commission for History of Mechanism and Machine Science.

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