



Under the aegis of the

ROMANIAN MINISTRY OF EDUCATION

ROMANIAN MINISTRY OF RESEARCH AND INNOVATION

ROTRIB'19

The 14th International Conference on Tribology
September 19-21, 2019 – Cluj Napoca, ROMANIA

organized by



TECHNICAL UNIVERSITY
OF CLUJ-NAPOCA



Romanian Tribology
Association



Content from this work may be used under the terms of the [Creative Commons Attribution 3.0 licence](https://creativecommons.org/licenses/by/3.0/). Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.



FOREWORD ROTRIB'19

ROTRIB'19 is the 14th Conference organized in Romania in a series of international scientific events on the subject of TRIBOLOGY. The general objective of this conference was to bring contributions to the fundamental applications and experiments in the field of Tribology and Nanotribology. The conference provided an interdisciplinary forum for discussions and networking as well as the aim to initiate collaborations among specialists regarding materials in Tribology and their application in product design and reliability at macro/ micro and nano-scale. The exchange of ideas, theories, developments, innovations, improved research methods and future trends was a key scope of this conference. This goal was achieved by bringing together specialists from the industry and the academic environment as well as leading and young researchers from various scientific fields.

Papers presented at ROTRIB 2019 are included in the following topics:

1. Friction and Wear
2. Contact Mechanics
3. Biotribology, tribology in medicine
4. Micro and nanotribology
5. Lubricants
6. Lubrication
7. Tribochemistry and tribocorrosion
8. Tribology of machine elements
9. Tribology in manufacturing processes
10. Surface metrology, surface engineering and coatings
11. Emerging technologies and industrial tribology
12. Condition monitoring

These topics were discussed in the different technical sessions. The official language of the ROTRIB'19 Conference was English. The conference received an excellent number of submissions from which, after a thorough peer reviewing process, 64 scientific contributions were accepted for presentation. The authors of the accepted papers were invited to present their work at the Conference, and so, we were pleased to welcome 87 participants from different countries.

The Conference program was enriched significantly by plenary presentations of renowned experts in their respective domains: Distinguished Professor Dr. Aurelio Somà (Italy) and Distinguished Professor Dr. Spiridon Cretu (Romania). The ROTRIB'19 Conference was organized by the Technical University of Cluj-Napoca and the Romanian Tribology Association, under the aegis of the Romanian Ministry for Research and Innovation. The Conference was held in Cluj-Napoca, ROMANIA at the Technical University of Cluj-Napoca.

The Conference was financially supported by the Technical University of Cluj-Napoca, the Romanian Tribology Association, and sponsors which participated at ROTRIB'19 with company profile presentations or product displays. We would like to express our gratitude to the authors for submitting their work. We would like to thank all those who have contributed, in one way or another, to the success of the Conference. We are grateful to the Scientific Committee members, as well as to the external reviewers for their volunteer hard work of reading and discussing the submissions. We would also like to express our thanks to the members of the Organizing Committee for their support.

It was a great pleasure for us to organize this Conference and we hope that the ROTRIB'19 Conference will stimulate future developments and innovations in the field of tribology.

We hope all participants had a successful conference and a pleasant time in Cluj-Napoca.

**Organizing Committee
October 2019, Cluj-Napoca, Romania**

ROTRIB'19



Committees

Chair of Conference:

Prof. Marius PUSTAN

Honorary Committee:

Prof. Napoleon ANTONESCU
Prof. Spiridon CRETU
Prof. Mihai GAFITANU

Prof. Mircea PASCOVICI
Prof. Liviu PALAGHIAN
Prof. Dumitru POP

Scientific Committee:

Assoc. Prof. Emilia ASSENOVA	BG	Prof. Jan MEHNER	DE
Prof. Arturo AYON	US	Prof. Athanassios MIHAILIDIS	GR
Prof. Bou-Said BENYEBKA	FR	Prof. Slobodan MITROVIC	RS
Prof. Corina BIRLEANU	RO	Dr. Raluca MULLER	RO
Prof. Mihaela BUCIUMEANU	RO	Prof. Ilie MUSCA	RO
Prof. Traian CICONE	RO	Prof. Nikolai MYSHKIN	BY
Prof. Lorena DELEANU	RO	Prof. Iuliu NEGREAN	RO
Assoc Prof. Adrian DRUMEANU	RO	Prof. Daniel NELIAS	FR
Prof. Valeriu DULGHERU	MD	Prof. Ludovic NOELS	BE
Prof. Nuria ESPALLARGAS	NO	Prof. Dumitru OLARU	RO
Prof. Aurelian FATU	FR	Prof. Razvan George RIPEANU	RO
Prof. Michel FILLON	FR	Prof. Alexandru RADULESCU	RO
Dr. Romeo GLOVNEA	UK	Prof. Filipe Samuel SILVA	PT
Prof. Simion HARAGAS	RO	Prof. Aurelio SOMÀ	IT
Prof. Hakan KALELI	TR	Prof. Marian SZCZEREK	PL
Prof. Mara KANDEVA	BG	Prof. Andrei TUDOR	RO
Prof. M. Baki KARAMIS	TR	Prof. Aleksandar VENCL	RS

Organizing Committee

Chair:

Prof. Corina BIRLEANU

Members:

Prof. Traian CICONE
Lecturer Stefan CRACIUN
Assist. Horea CRISAN
Lecturer Felicia CRISTEA
Prof. Simion HARAGAS

Drd. Ionut MARIES
Lecturer Violeta MERIE
Prof. Marius PUSTAN
Prof. Minodora RIPA
Lecturer Florina SERDEAN

Reviewers

Stelian Alaci, Marius Alexandrescu, Gabriel Andrei, Sorin Besoiu , Corina Bîrleanu , Mihaela Buciumeanu , Ovidiu Buiga, Traian Cicone, Adrian Circumaru, Cornel Ciupan, Radu Cotetiu, Stefan Ionut Craciun, Spiridon Cretu, Lorena Deleanu, Adrian Catalin Drumeanu, Cristian Dudescu, Romeo Glovnea, Simion Haragas, Crisan Horea George , Ilie Musca, Luminita Irimescu, Juliana Javorova, Violeta Valentina Merie, Ludovic Noels, Simona Noveanu, Dumitru Olaru, Liviu Palaghian, Viorel Paleu, Dumitru Ovidiu Pop , Claudiu Popa, Alexandru Valentin Radulescu, Minodora Ripa, Razvan George Ripeanu, Florina Maria Serdean, Iacob Liviu Scurtu, Chippa Shriniwas, Aurelio Soma', Marian Szczerek, Nacer Tala Ighil, Radu Velicu, Aleksandar VencI, Sorin Cristian Vladescu.

Sponsors

