



**FACULTY OF MECHANICAL ENGINEERING KRALJEVO
UNIVERSITY OF KRAGUJEVAC
KRALJEVO – SERBIA**

THE SEVENTH INTERNATIONAL TRIENNIAL CONFERENCE

HEAVY MACHINERY HM 2011

PROCEEDINGS

Vrnjačka Banja, June 29th – July 2nd 2011.



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PREFACE

The Faculty of Mechanical Engineering Kraljevo has been traditionally organizing the international scientific conference devoted to heavy machinery every three years. The VII International Scientific Conference HM 2011 is considering modern methods and new technologies in the fields of transport design in machinery, control energy, production technologies, urban engineering and civil engineering through thematic sessions for the purpose of sustainable competitiveness of economic systems. Modern technologies are exposed to fast changes at the global world level so that their timely application both in large industrial systems and in medium and small enterprises is of considerable importance for the entire development and technological progress of economy as a whole.

The VII International Scientific Conference Heavy Machinery HM 2011 is a place for exchange of experiences and results accomplished in domestic and foreign science and practice, with the goal to indicate directions of further development of our industry on its way toward integration in European and world economic trends. Exchange of experiences between our and foreign scientific workers should contribute to extension of international scientific-technical collaboration, initiation of new international scientific-research projects and broader international collaboration among universities.

The papers which will be presented at this Conference have been classified into seven thematic fields:

- A. Railway Engineering
- B. Earth-Moving and Transportation Mechanization
- C. Automatic control and fluid technique
- E. Mechanical Design and Mechanics
- F. Production Technologies
- G. Urban Engineering
- H. Structures And Materials In Civil Engineering

Within this Conference, the First International Students Symposium will be held. The aim is to open a scientific discussion on this actual problem in industry among young students.

The sponsorship by the Ministry of Science of the Republic of Serbia is the proper way to promote science and technology in the area of mechanical engineering in Serbia.

On behalf of the organizer, I would like to express our thanks to all organizations and institutions that have supported this Conference. I would also like to extend our thanks to all authors and participants from abroad and from our country for their contribution to the Conference. And last but not the least, dear guests and participants in the Conference, I wish you a good time in Kraljevo – Vrnjačka Banja and see you again at the Eight Conference, in three years.

Kraljevo – Vrnjačka Banja, June 2011

Conference Chairman,

Prof. Dr. Novak Nedić, mech eng.

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