

International Conference

FT 2023

Fluid Power 2023



Conference Programme

CONGRESS CENTRE HABAKUK

SLOVENIA - MARIBOR, 20. - 21. SEPTEMBER 2023

International conference Fluidna Tehnika / Fluid Power 2023

Ladies and Gentlemen!

On behalf of the organizing committee, it is a great pleasure for us to welcome you to the international conference Fluid Power 2023 which will be held **at Congress Centre Habakuk in Maribor, September 20-21, 2023**. The conference is intended for everyone who encounters hydraulic or pneumatic devices, and everyone who want to be informed about the "state of the art" and about innovations in the field of hydraulics and pneumatics.

The gathering of experts at this conference in Maribor has been a tradition since 1995 and is organised by the Faculty of Mechanical Engineering at the University of Maribor, in Slovenia. Fluid power conferences are organised every second year and cover those principal technical events within the field of fluid power technologies in Slovenia, and throughout this region of Europe. The contributions are thematically collected in individual sections and cover the main areas of the profession. Within the framework of the traditional Round Table, always on a current topic, we confront the opinions of various stakeholders.

We wish all participants at the International conference Fluidna Tehnika / Fluid Power 2023 continued successful professional work, and hope that we have yet again added another small piece within the mosaic of fluid power.

Organizing committee



Conference programme:

Wednesday, 20th September 2023 – Hall Mlinařik

- 08:00 *Arrival and Registration*
- 09:00 *Opening ceremony*
- 09:30 **OPENING SESSION - Invited lectures**
- 11:00 *Coffee break*
- 11:30 **Session I**
- 13:30 – 15:00 *Main break - Lunch*
- 15:00 **Session II**
- 16:30 **Round table – Fluid Power Microcredential**
- 08:00 – 18:00 **Exhibition, e-Poster session**
- 18:00 **Social evening – Embraced by Fluid Power**

Thursday, 21st September 2023 – Hall Mlinařik

- 08:00 *Registration, information*
- 09:00 **Session III**
- 10:30 *Coffee break*
- 11:00 **Session IV**
- 12:30 *Coffee break*
- 13:00 **Session V**
- 14:30 **Summary of FT2023, Conclusion**
- 14:30 – 16:00 *Main break - Lunch*
- 16:00 **Ceremonial Academy on the occasion of the 30th anniversary of the SDFT association**
- 08:00 – 18:00 **Exhibition**

all papers will be presented and printed in English language



Opening Session – Invited Lectures

Wednesday, 20. 9. 2023 | 9:30 – 11:00 | Hall Mlinařik

Fluid Power Technology and development trends

F. Majdič

University of Ljubljana, Ljubljana, Slovenia

Legal requirements of hydraulic power units

T. Tašner

HAWE Hidravlični sistemi d.o.o., Slovenia

Trends in hydraulics from the point of view of the manufacturer of hydraulic components

A. Bizjak

Poclain Hydraulics d.o.o., Slovenia



Session I:
Fluid Power Components & Design
Wednesday, 20. 9. 2023 | 11:30 – 13:30 | Hall Mlinařik

Wave propagation in hydraulic transmission lines - state of the art in efficient simulation models

B. Manhartsguber

Tool for the Design and Simulation of Hydrostatic Bearings in Machine Tools

D. Kriegl, J. Edler

Graz University of Technology, Graz, Austria

A simulation study on the feasibility of valve spool stabilization under the influence of spool core elasticity and shape tolerances

S. Leonhartsberger, B. Manhartsguber

JKU - Johannes Kepler Universität Linz, Linz, Austria

The influence of tilt angle of the inclined plate on the gradient of the pressure increase in the piston axial pump cylinder

A. Banaszek¹⁾, P. Dařić²⁾, E. Turmanidze³⁾

¹⁾ West Pomeranian University of Technology, Poland, ²⁾ Akademija strukovnih studija Šumadija, Trstenik, Serbia; Georgian Technical University (GTU), ³⁾ Faculty of Transportation and Mechanical Engineering, Tbilisi, Georgia

Optimization of Axial piston water pumps in the development phase

S. Savić¹⁾, N. Todić¹⁾, S. Cvejić²⁾

¹⁾University of Kragujevac, Faculty of Engineering, Kragujevac; ²⁾ University "Union-Nikola Tesla" of Belgrade - Faculty of Information Technology and Engineering, Belgrade; Serbia

A contribution to research into the design and analysis of a hydraulic robotic arm

A. Osmanović, E. Trakić, S. Čosić, M. Bećirović

University of Tuzla, Tuzla, Bosnia and Herzegovina

Oscillation problems by the use of Moog D633 semi-servo valves due to spool oscillation and avoidance by changing hose lengths and controller behaviour (Poster)

Kriegl D., Edler, J.; TU Graz, Austria

**Session II:
Education and Fluid Power**

Wednesday, 20. 9. 2023 | 15:00 – 16:30 | Hall Mlinařik

Innovative mechatronic systems with advanced control methods

*Ž. Šitum, J. Benić, B. Budija, B. Hesky, L. Bačevina, J. Đurinović
University of Zagreb, Zagreb, Croatia*

Didactics in I4.0 Fluid Power Systems

*V. Tič
University of Maribor, Maribor, Slovenia*

Fluid Power Microcredentials - new possibilities to acquire necessary knowledge

*D. Lovrec
University of Maribor, Maribor, Slovenia*

Round Table – Discussion

Wednesday, 20. 9. 2023 | 16:30 | Hall Mlinařik

*Microcredentials as a new approach in the field of education
Confrontation of opinions: participants from industry, educational institutions and the
Ministry of Higher Education, Science and Innovation*



**Session III:
Components and Design**

Thursday, 21. 9. 2023 | 09:00 – 10:30 | Hall Mlinařik

Design guidelines for non-standard plugs

A. Ćelik¹, B. Jerman², F. Majdiĉ²

¹ Poclain Hydraulics d.o.o., ² University of Ljubljana, Slovenia

Development of a new hydraulic freewheeling valve HCC-200

J. Bradeřko

Poclain Hydraulics d.o.o, Slovenia

3D printing for hydraulic components

J. Bartolj

University of Ljubljana, Ljubljana, Slovenia

Design and control of miniature water vessels

Ź. řitum, J. Beniĉ, T. Fain, P. Kařtelan

University of Zagreb, Zagreb, Croatia

Analysis of valve plate stress in an axial piston pump (Poster)

N. Todiĉ¹, M. Andjelkoviĉ², R. Petroviĉ³

¹ University of Kragujevac, Faculty of Engineering, Kragujevac; ² University "Union-Nikola Tesla" of Belgrade - Faculty of Information Technology and Engineering, Belgrade; ³ Faculty of Mechanical and Civil Engineering in Kraljevo, Kraljevo; Serbia



Session IV:
Control Systems, Simulation & Testing
Thursday, 21. 9. 2023 | 11:00 – 12:30 | Hall Mlinařik

Mud pump pressure pulsation control systems

M. Cipek, D. Pavković, J. Benić, Ž. Šitum
University of Zagreb, Zagreb, Croatia

Simulation analysis of influential parameters effecting the hydraulic press behaviour

M. Šimic, D. Janković, K. Matoša, N. Heraković
University of Ljubljana, Ljubljana, Slovenia

Gear pump hydraulic testing and simulation

N. Novak, A. Trajkovski, J. Bartolj, J. Pustavrh, F. Majdič
University of Ljubljana, Ljubljana, Slovenia

EOL valve test bench automatization

P. Oblak
Poclain Hydraulics d. o. o., Slovenia

Implementation of external Matlab closed-loop controllers within Beckhoff Soft-PLC controller

V. Tič
University of Maribor, Maribor, Slovenia



**Session V:
Fluids and Tribology**

Thursday, 21. 9. 2023 | 13:00 – 14:30 | Hall Mlinařik

Polymers for sustainable hydraulic valves tested in water, glycerol-water mixture and hydraulic oil

*A. Trajkovski, N. Novak, J. Bartolj, J. Pustavrh, F. Majdič
University of Ljubljana, Ljubljana, Slovenia*

Air release of used hydraulic mineral-based oils

M. Kambič¹⁾, D. Lovrec²⁾

¹⁾ OLMA d.o.o, Ljubljana; ²⁾ University of Maribor, Maribor, Slovenia

Air release and foaming properties of hydraulic oils

*M. Vidmar, A. Hrobat, M. Kambič
OLMA d.o.o., Ljubljana, Slovenia*

Cleanliness of valve components – research of basic washing parameters through measuring dynamic surface tension of liquids

S. Burnik

Poclain Hydraulics d.o.o, Slovenia

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Summary and Conclusion



General sponsor:



Social evening sponsor:



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Social Evening: Embraced by Fluid Power

Social evening, organized at the end of the first day of the conference, is a great opportunity to relax at the end of the day, and to chat with others in a pleasant atmosphere, make new contacts and exchange some ideas.

This year's social evening will take place in the lobby of the Mlinarik congress hall, where we will socialize with a cultural and culinary program. Throughout the evening, we will be entertained by the Oldies Dixie Band with well-known members, some of whom are also closely related to the field of fluid power technology. With their music and hits that we all remember well, they will take us back in time. For this reason, part of the lineup will also be with us at the Celebratory Academy on the 30th anniversary of the Slovenian Fluid Power Society. And the highlight of the social evening: we will be visited by a well-known world star singer.



The sponsor of social evening is **Poclain Hydraulics d.o.o., Slovenia.**



Location:

Hotel Habakuk**** **Congress centre Habakuk**

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SI-2000 Maribor

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