



HERVICON + PUMPS



September 8-11, 2020, SumSU, Sumy, Ukraine

***XVI International Scientific and Engineering Conference
Hermetic Sealing, Vibration Reliability and Ecological Safety of
Pump and Compressor Machinery***



PROGRAM OF VIRTUAL CONFERENCE

PARTNERS

*Sumy State University
Hydraulic Machines and Systems Group
JSC Nasosenergomash Sumy
TRIZ Ltd.*

*Kielce University of Technology
Institute Pprime of University of Poitiers
Wroclaw University of Technology
Silesian University of Technology
Sumy National Agrarian University*

INFORMATIONAL SUPPORT

*Journal of Compressor and Power Engineering,
Journal of Engineering Sciences,
<https://www.worldpumps.com/events/2020-09/>,
<https://impeller.net/event/herviconpumps-conference-2020/>*

Dear Colleagues !

The Regular XVI International Scientific and Engineering Conference **Hermetic Sealing, Vibration Reliability and Ecological Safety of Pump and Compressor Machinery – HERVICON+PUMPS-2020** will be held **virtually** in the Sumy State University (Sumy, Ukraine) on **September 8, 2020**.

Sumy City is one of the largest centers of pump and compressor machinery in Eastern Europe. The many leading engineering companies of Ukraine in this area are located in it, such as JSC Nasosenergomash Sumy, JSC VNIIAEN, JSC Sumy NPO, TRIZ Ltd., et al. Therefore, scientists and specialists in the field of pump and compressor machinery, sealing technology, bearings, and vibration reliability of centrifugal machines, as well as representatives of manufacturers and consumers of compressor and pump equipment are invited to participate in the Conference.

The Conference is dedicated to the memory of its founder and permanent Chairman of the Organizing Committee Dr., Prof., Dr.h.c. Volodymyr Martsynkovskyy. He was the well-known scientist in the field of centrifugal pump hydrodynamics and strength, sealing technology and rotordynamics, honored worker of science and technology of Ukraine, distinguished professor of Sumy State University, doctor honoris causa of Kielce University of Technology (Poland). And as well he was the holder of the Order of Merit of the Republic of Poland in the 2017 year from Andrzej Duda, the President of the Republic of Poland. In the 1976 year, Volodymyr Martsynkovskyy founded a Scientific and Technical Meeting on Sealing Technology, which, subsequently, grew into the International Scientific and Engineering **HERVICON+PUMPS** Conference.

Organizing Committee

INFORMATION FOR CONFERENCE PARTICIPANTS

The time limit for a presentation with discussion is **15** minutes.

The presentation must be prepared in the Microsoft Power Point program and sent to the Conference Organizing Committee before **04.09.2020**. Preliminary video recording of the presentation is possible. Posters will be placed in the Poster section and on the Conference website. To prepare your Presentation and Poster, you can use Templates that will be sent by email.

The video stream of the Conference will be held on a separate *YouTube* channel: <https://youtu.be/eoep3HcETRw>.

*Please get in touch on Skype: <https://join.skype.com/kylBBiKopqkT> with **Login name (First name and Surname)** 5 minutes before the start of your presentation, as well as, if necessary, to ask questions and participate in discussions. Short questions can be asked in the *YouTube* chat.*

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Tuesday, 08.09.2020

Beginning at 9⁰⁰ (Kyiv Time)

Andriy Zahorulko (Sumy State University), Igor Tverdokhlebo (HMS Group)
Introductory speech dedicated to the memory of founder and permanent Chairman of the Conference Organizing Committee, the well-known scientist and teacher, Dr., Prof., Dr.h.c. Volodymyr Martsynkovskyy

Break 5 min.

Section 1

DEVELOPMENT, MODERNIZATION AND IMPROVEMENT OF POWER MACHINES

9²⁰ – 10³⁵

Session I Prospective ways of power machines development

Chairman: *Grzegorz Peczkis, Silesian University of Technology*

1.1 O. Kovtun (JSC Nasosenergomash Sumy), I. Tverdokhlebo (HMS Group), S. Lugova (JSC Nasosenergomash Sumy), O. Makivskii, O. Lugovii (Sumy State University)

Axial forces in multistage back-to-back pumps

1.2 I. Kovaliov, A. Ratushnyi, T. Dzafarov, A. Mandryka, A. Ignatiev (Sumy State University)

Predictive vision of development paths of pump technical systems

1.3 S. Vaneev, T. Rodymchenko, S. Meleychuk, V. Baga, O. Bolotnikova (Sumy State University)

Influence of the degree of off-design of the traction nozzle of a jet reaction turbine on its efficiency

1.4 O. Kostornoi, P. Tkach, O. Bondariev, N. Podopryhora (JSC VNIIAEN)

Design of impeller blades in the intermediate stage of centrifugal pump to a preset meridional flow pattern

1.5 G. Peczkis, T. Synowiec (Silesian University of Technology), A. Zahorulko (Sumy State University)

New flowing system in cooling system axial-flow pump in a hard coal electric power plant

Break 5 min.

10⁴⁰ – 11⁵⁵

Session II Modernization and improvement of centrifugal pumps characteristics

Chairman: *Przemyslaw Szulc, Wroclaw University of Science and Technology*

1.6 A. Ratushnyi, A. Sokhan, I. Kovaliov, A. Mandryka, A. Ignatiev (Sumy State University)

Modernization of centrifugal impeller blades

1.7 S. Antonenko, S. Sapozhnikov (Sumy State University)

Creation a universal technique of predicting performance curves for small-sized centrifugal stages of well oil pump units

1.8 V. Kondus, O. Gusak, J. Yevtushenko (Sumy State University)

Investigation of the operating process of a high-pressure centrifugal pump with taking into account of improvement the process of fluid flow in its flowing part

1.9 A. Chernobrova, M. Sotnyk, O. Moloshnyi (Sumy State University) and V. Boiko (National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”)

Influence of different volute casings theoretical methods design on pump working processes

1.10 O. Moloshnyi (Sumy State University), P. Szulc (Wroclaw University of Science and Technology) and G. Moliński (Pompax Sp. z.o.o.)

The analysis of the performance of a sewage pump in terms of the wear of hydraulic components

Break 5 min.

12⁰⁰ – 12⁴⁵

Session III Improving the efficiency of the vortex pump workflow

Chairman: Andrii Rogoyi, Kharkiv National Automobile and Highway University

1.11 A. Rogoyi, V. Korohodskyi (Kharkiv National Automobile and Highway University), S. Khovanskyi (Sumy State University), I. Hrechka (National Technical University Kharkiv Polytechnic Institute) and Y. Medvediev (Volodymyr Dahl East Ukrainian National University)

Optimal design of vortex chamber pump

1.12 A. Machalski, J. Skrzypacz, P. Szulc, D. Błoński (Wroclaw University of Technology)

Experimental and numerical research on influence of winglets arrangement on vortex pump performance

1.13 P. Szulc, A. Machalski, J. Skrzypacz, D. Blonski (Wroclaw University of Science and Technology)

The numerical simulation of the rope vortex creation and the possibilities of its control

Break 5 min.

12⁵⁰ – 13²⁰

Session IV Improving the performance of labyrinth screw and axial pumps

Chairman: Andrii Rogoyi, Kharkiv National Automobile and Highway University

1.14 P. Andrenko (National Technical University Kharkiv Polytechnic Institute), A. Rogoyi (Kharkiv National Automobile and Highway University), I. Hrechka (National

Technical University Kharkiv Polytechnic Institute), S. Khovanskyi (Sumy State University), and M. Svynarenko (Kharkiv National University of Construction and Architecture)

Characteristics improvement of labyrinth screw pump using design modification in screw

1.15 I. Altyntsev, D. Homa (POWEN-Wafapomp Group), G. Peczkis (Silesian University of Technology)

Modifications of propeller pumps design algorithm. Numerical and laboratory tests

Break 5 min.

13²⁵ – 13⁵⁵

Session V The hydraulic systems and rotary machine components analysis

Chairman: Ievgen Konoplianchenko, Sumy National Agrarian University

1.16 G. Romanik, J. Rogula, A. Machalski (Wroclaw University of Science and Technology)

Experimental and numerical analysis of the rail with the heat control valves

1.17 V. Melnyk, V. Vlasovets (Kharkiv Petro Vasylenko National Technical University of Agriculture), I. Konoplianchenko, V. Tarelnyk, M. Dumanchuk and Vas. Martsynkovskyy (Sumy National Agrarian University)

Developing a System and Criteria for Directed Choice of Technology to Provide Required Quality of Surfaces of Flexible Coupling Parts for Rotor Machines

Break 5 min.

Section 2

TRIBOLOGY, DYNAMICS AND STRENGTH OF TURBOMACHINERY COMPONENTS

14⁰⁰ – 15³⁰

Session I Mechanical, annular and labyrinth seals

Chairman: Noel Brunetiere, Institute Pprime of University of Poitiers

2.1 T.A. Shihab (Middle Technical University/Engineering Technical College of Baghdad), L. Shlapak (Ivano-Frankivsk National Technical University of Oil and Gas), N.S. Namer (Middle Technical University/Engineering Technical College of Baghdad), P. Prysyzhnyuk, O. Ivanov and M. Burda (Ivano-Frankivsk National Technical University of Oil and Gas)

Increasing of durability of mechanical seals of oil and gas centrifugal pumps using tungsten-free metal-ceramic composites

2.2 Ryszard Dindorf (Kielce University of Technology)

A Numerical Solution of Temperature Distribution in the Clearance and the Sealing Rings of the Non-Contact Face Seal

2.3 S. Gorovoy, G. Golovchenko, M. Dumanchuk (Sumy National Agrarian University)
Determination of angular stiffness factor of the annular seal experimentally - calculated by.

2.4 O. Pozovniy, A. Zahorulko (Sumy State University), G. Peczkis (Silesian University of Technology), C. Kundera (Kielce University of Technology)

Influence of geometrical parameters of the chamber on the total radial hydrostatic force in a two-annular seal

2.5 Y. Tarasevych (AGH University of Science and Technology), N. Sovenko and I. Savchenko (Sumy State University)

Influence of operational changes of clearances in pump channels on the work of the automatic balancing device

2.6 V. Andrusiak (JSC VNIIAEN), S. Lugova (JSC Nasosenergomash Sumy), S. Medvid, P. Tkach and A. Rudenko (JSC VNIIAEN)

Effect of front impeller seal leakages on centrifugal stage characteristics

Break 5 min.

15³⁵ – 16²⁰

Session II Bearings

Chairman: Jean Bouyer, Institute Pprime of University of Poitiers

2.7 Vas. Martsynkovskyy, K. Liubchenko, A. Prokopenko (TRIZ LTD), A. Lazarenko (Sumy State University)

Damper thrust bearing with fluid pivot

2.8 L. Ropyak, A. Velychkovych, V. Vytvytskyi, M. Shovkoplias (Ivano-Frankivsk National Technical University of Oil and Gas)

Analytical study of “crosshead – slide rail” wear effect on pump rod stress state

2.9 I. Konoplianchenko, V. Tarellyk, Vas. Martsynkovskyy (Sumy National Agrarian University), O. Gaponova, A. Lazarenko (Sumy State University), A. Sarzhanov, M. Mikulina (Sumy National Agrarian University), Z. Zhengchuan (Sumy National Agrarian University and Henan Institute of Science and Technology) and V. Pirogov (G.K. Parts Group LCC)

New technology for restoring Babbitt coatings

Break 5 min.

16²⁵ – 17²⁵

Session III Rotordynamics, dynamics and strength

Chairman: Jan Krmela, Alexander Dubček University of Trenčín

2.10 A. Yashchenko, A. Verbovyi (JSC VNIIAEN), A. Rudenko (JSC Nasosenergomash Sumy)

Computational study of the effect of duty and mounting to foundation compliance on rotor and pump natural frequencies

2.11 M. Tkachuk, A. Grabovskiy, M. Tkachuk, A. Zarubina, A. Lipeyko (National Technical University “Kharkiv Polytechnic Institute”)

Analysis of elastic supports and rotor flexibility for dynamics of a cantilever impeller

2.12 A. Zinkovskii and A. Stel'makh (G.S. Pisarenko Institute for Problems of Strength of the National Academy of Sciences of Ukraine)

Prediction of stability against subsonic flutter for axial turbine machine compressor blade assemblies

2.13 A. Dzyuba, Yu. Selivanov (Oles Gonchar Dnipro National University)

Research of strength characteristics and optimization of parameters of hull structures using holographic interferometry

Break 5 min.

17³⁰ – 18⁰⁰

Session IV Power transmission

Chairman: *Ievgen Konoplianchenko, Sumy National Agrarian University*

2.15 V. Tarelyk, Vas. Martsynkovskyy, D. Hlushkova, M. Dumanchuk, I. Konoplianchenko, N. Tarelyk, M. Mikulina, G. Smolyarov, O. Semernya, M. Dovzhyk, M. Nahornyi, O. Vasilenko, S. Bondarev (Sumy National Agrarian University), B. Antoszewski, Cz. Kundera (Kielce University of Technology), S. Hudkov (Sumy State University)

Increasing fretting resistance of flexible element pack for rotary machine flexible coupling

2.16 M. Ivanov, O. Pereyaslavskiy, S. Shrhordskiy, R. Hrechko (Vinnitsa National Agrarian University), V. Mazurenko, Holovko (Hydrosila APM, Private Joint Company)

Vibration resistance of HST 90 hydrostatic transmission

18⁰⁰ – 19⁰⁰

Poster section 1

Chairman: *Maryna Demianenko, Sumy State University*

P.1 A. Tomaszewski, T. Przybyliński, M. Lackowski (Institute of Fluid-Flow Machinery Polish Academy of Sciences), E. Krzemiński (Zakład Produkcji Doświadczalnej Automatyki Co.), J. Rogula, G. Romanik, D. Błoński (Wrocław University of Science and Technology)

The measuring system for air mass flow rate determination – difficult measuring conditions – case study

P.2 A. Kulikov, A. Ratushnyi, I. Kovaliov, A. Mandryka, A. Ignatiev (Sumy State University)

Numerical study of the centrifugal contra rotating blade system

P.3 M. Sotnyk, V. Moskalenko and O. Strokin (Sumy State University)

Influence of construction and operating pump parameters on pressure pulsations amplitude

P.4 R. Puzik, I. Kovalyov, O. Ratushnyi, T. Dzafarov, S. Petrenko (Sumy State University)

The ways to increase the efficiency of the stage of low specific speed

P.5 D. Błoński, P. Szulc, A. Machalski, J. Rogula (Wroclaw University of Science and Technology)

Numerical simulation and experimental investigation of submersible sewage mixer performance

P.6 P. Szulc (Wroclaw University of Science and Technology), G. Moliński (Pompax Sp. z.o.o.) and O. Moloshnyi (Sumy State University)

The influence of the impeller construction on the performance of one channel pump

P.7 J. Skrzypacz, P. Szulc (Wroclaw University of Science and Technology)

The influence of a pipe impeller external shape on the pump parameters

P.8 S. Sapozhnikov, S. Antonenko (Sumy State University)

Effect of gas content in the pumped liquid on the characteristics of a torque flow pump

P.9 V. Panchenko, V. German, V. Kondus, O. Ivchenko, O. Rysnaya (Sumy State University)

Combined Operating Process of Torque Flow Pump

P.10 V. Kondus, V. German, V. Panchenko (Sumy State University)

Improving the efficiency of the operating process of high specific speed torque-flow pumps by upgrading the flowing part design

P.11 D. Prokopenko, I. Shatskyi, M. Vorobiov and L. Ropyak (Ivano-Frankivsk National Technical University of Oil and Gas)

Cyclic deformation of separating tape in electromagnetic rolling pump

P.12 O. Gusak (Sumy State University), M. Cherkashenko, O. Potetenko, A. Gasiyk, K. Rezvaya (National Technical University “Kharkiv Polytechnic Institute”)

Improving reliability and efficiency of hydraulic turbines

P.13 A. Panchenko, A. Voloshina, O. Titova, I. Panchenko (Dmytro Motornyi Tavria State Agrotechnological University)

The influence of the design parameters of the rotors of the planetary hydraulic motor on the change in the output characteristics of the mechatronic system

Poster section 2

Chairman: *Oleksandr Pozovniy, Sumy State University*

P.1 J. Krmela (Alexander Dubček University of Trenčín), A. Artyukhov (Sumy State University), V. Krmelová (Alexander Dubček University of Trenčín) and O. Pozovniy (Sumy State University)

Determination of Material Parameters of Rubber and Composites for Computational Modeling Based on Experiment Data

P.2 A. Radionov (LLC Ferrohydrodynamica), A. Podoltsev (NASU Institute of Electrodynamics), A. Radionova (LLC Ferrohydrodynamica)

Magnetic field in the core of a magnetic fluid seal taking magnetic structural elements into account

P.3 V. Martsynkovskyy, S. Hudkov, A. Zahorulko (Sumy State University) and Cz. Kundera (Kielce University of Technology)

Dynamics of impulse seals with tubular feeders

P.4 A. Zahorulko, V. Izemenko (Sumy State University), Vas. Martsynkovskyy (TRIZ LTD), Y.-B. Lee (Korea institute of Science and Technology)

CFD analysis of leakage rate and rotordynamic characteristics of labyrinth-scallop seals

P.5 A. Zahorulko, D. Kayota (Sumy State University), Vas. Martsynkovskyy (TRIZ LTD), J. Bouyer, N. Brunetiere (Institute PPrime of University of Poitiers)

Investigation of the effect of oil scrapers on the thermal state and bearing capacity of a tilting pad thrust bearing

P.6 A. Voloshina, A. Panchenko, O. Titova, I. Panchenko (Dmytro Motornyi Tavria State Agrotechnological University)

Changes in the dynamics of the output characteristics of mechatronic systems with planetary hydraulic motors

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