Nosov Magnitogorsk State Technical University

The 4th International Youth Workshop

MAGNITOGORSK ROLLING PRACTICE 2019

4-7 June

PROGRAM BOOK

Dedicated to the 85th anniversary of
Nosov Magnitogorsk State Technical University

Conference organized by

Nosov Magnitogorsk State Technical University, Magnitogorsk

Mechanics of Gradient Nanomaterials laboratory, Magnitogorsk

South Ural State University, Chelyabinsk

Ural Federal University named after the First President of Russia B.N. Yeltsin, Ekaterinburg

Siberian Federal University, Krasnoyarsk

Perm National Research Polytechnic University,Perm

Institute for Metals Superplasticity Problems of RAS, Ufa

University of Padua, Italy

Indian Institute of Information Technology, Design and Manufacturing Jabalpur, India

Rudny Industrial Institute, Rudny, Kazakhstan

PJSC Magnitogorsk Iron & Steel Works, Magnitogorsk

OJSC MMK-METIZ, Magnitogorsk

Dear colleagues!

On behalf of the organizing committee, we are glad to welcome you to the 4th International Youth Scientific and Practical Conference ***Magnitogorsk Rolling Practice 2019***. This year the conference is dedicated to the 85th anniversary of NMSTU and the 90th anniversary of Magnitogorsk.

Magnitogorsk is one of centers of global metallurgy, combining considerable industrial and scientific resources. That is why in 2014 scientists from Nosov Magnitogorsk State Technical University announced the initiative of holding the youth forum as the workshop devoted to fundamental and applied issues of metal and alloy forming processes.

The idea of holding the youth conference found a positive response among scientists, specialists and students of Russia, the CIS and farther abroad. Topics of the conference are currently important, as evidenced by support continuously rendered by the Russian Foundation for Basic Research and expanded geography of participants. Many young scientists presenting their research papers at previous conferences prepared and successfully defended their PhD theses.

In 2019 conference participants will listen to plenary reports delivered by well-known foreign and Russian scientists, attend conference sessions, take a tour of PJSC Magnitogorsk Iron and Steel Works and enjoy the entertainment program. Young scientists, presenting the best reports, will be awarded prizes and invited to publish their papers in journals, information partners of the conference, indexed in Scopus and included into the list of Russian peer-reviewed scientific publications.

We are sure that communications, as part of the conference, will add impetus to development and strengthening of collaboration between young scientist in the field of metal and alloy forming processes, establishment of new research groups to take on ambitious challenges.

The conference organizing committee expresses its deep gratitude to all participants for their contribution to reach objectives and fulfill tasks of the conference.

We wish you rewarding work in welcoming Magnitogorsk!

Chairperson
of the Organizing
Committee

Alexey Korchunov

The Program Committee

Chairman of the Program Committee – Oleg N. Tulupov

Deputy Chairman of the Program Committee – Aleksandr M. Pesin

I. Calliari – professor, supervisor of the Master's degree programmes in Metallurgy, Materials Engineering (University of Padua, Italy);

L.V. Radionova - PhD (Eng.), head of the Department of Metal Forming Processes and Machines (South Ural State University, Chelyabinsk);

Yu. N. Loginov – D.Sc., Professor at the Department of Metal Forming (Ural Federal University, Ekaterinburg, Russia);

D. Rajiv – professor, head of Department of Metallurgical Engineering and Materials Science (Indian Institute of Technology Bombay);

V.N. Trofimov –D.Sc. (Eng.), professor at the Department of Machine Dynamics and Strength (Perm State Technical University, Perm, Russia);

A.V. Vydrin – professor, D.Sc. (Eng.), deputy general director responsible for research, (Russian R&D Institute of Piping, Chelyabinsk, Russia);

I.P. Mazur – professor at the Department of Metal Forming, professor, D.Sc. (Eng.) (Lipetsk State Technical University, Lipetsk, Russia);

S.A. Zaydes – head of the Department of Mechanical Engineering and Materials, professor, D.Sc. (Eng.) (Irkutsk State Technical University, Irkutsk, Russia);

S.B. Sidelnikov – head of the Department of Metal Forming, professor, D.Sc. (Eng.) (Institute of Non-Ferrous Metals and Materials Science, Siberian Federal University, Krasnoyarsk, Russia);

G.I. Raab – head of the Laboratory of Intensive Plastic Deformation Techniques, professor, D.Sc. (Eng.) (Ufa State Aviation Technical University, Ufa, Russia);

J.-B. Vogt - École Nationale Supérieure de Chimie de Lille (France);

R. Kawalla – Freiberg University of Mining and Technology (Freiberg, Germany);

K. Mori – Toyohashi University of Technology (Japan);

A. Zhilyaev – D.Sc. (Physics & Mathematics), Head of Mechanics of Gradient Nanomaterials laboratory (NMSTU), Principal Researcher (Institute for Metals Superplasticity Problems of RAS, Ufa, Russia);

I. Akhatov – D.Sc. (Physics & Mathematics), Professor, Director of the Skoltech Center for Design, Manufacturing and Materials (Moscow, Russia).

The Organizing Committee

Chairman of the Organizing Committee – Alexey G. Korchunov

Deputy Chairman of the Organizing Committee – Eduard Yu. Mescheryakov

A.S. Savinov – D.Sc. (Eng.), professor, director of Institute of Metallurgy, Mechanical Engineering and Materials Processing.
M.A. Polyakova - D.Sc. (Eng.), professor at the Department of Materials Processing.
K.G. Pivovarova - PhD (Eng.), associate professor at the Department of Materials Processing.
M.V. Potapova – PhD (Eng.), associate professor at the Department of Metallurgy and Chemical Technologies.
A.E. Gulin – PhD (Eng.), associate professor at the Department of Materials Processing.
A.N. Shemetov – PhD (Eng.), head of Analytics Department, a part of NMSTU's Strategic Planning Office.
D.V. Konstantinov – PhD (Eng.), head of International Affairs Office.
E.M. Medvedeva – specialist of International Affairs Office.

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Conference website: http://mrp.magtu.ru/en

Access to free Wi-Fi:

Network - Free_Wi-Fi

Password - FzmguC9E.

Tuesday, 4th June 2019

Registration (NMSTU main building, 38 Lenin str., lobby in front of the assembly hall)	$10^{00} – 11^{00}$
Plenary Session (NMSTU conference room (231), 38 Lenin str.)	
1. Rector's opening speech ***Mikhail Chukin***	$11^{00} – 11^{05}$
2. Welcome speech of Chairperson of the Organizing Committee ***Alexey Korchunov***, *Vice Rector for International Affairs, NMSTU*	$11^{05} – 11^{10}$
3. Elevated temperature – incremental forming ***Puneet Tandon****, PDPM Indian Institute of Information Technology, Design and Manufacturing Jabalpur, Jabalpur, Madhya Pradesh, India*	$11^{10} – 11^{50}$
4. Electrically enhanced plastic deformation of steels ***Irene Calliari****, University of Padua, Italy*	$11^{50} – 12^{30}$
5. Welcome presentation of 5th ECCOMAS Young Investigators Conference (YIC2019) and 18th International Conference Metal Forming 2020 ***Anna Smyk***, *AGH University, Poland*	12^{30}-12^{45}
Photo Session (University Square, 38 Lenin str.)	12^{45}-12^{50}
Coffee - Break (38 Lenin str., room 236)	$12^{50} – 13^{30}$
6. Atomistic simulations of deformation mechanisms during metal forming ***Elena Korznikova***, *Institute for Metals Superplasticity Problems of RAS, Ufa, Russia*	$13^{30} – 14^{10}$
7. Enhanced mechanical properties of metal sheets by special rolling techniques ***Hailiang YU****, Central South University, China*	$14^{10} – 14^{50}$
8. Recent Advances in Metal Forming Simulation: Microstructure, Phase Transformation and Ductile Fracture ***Sergey Stebunov,*** *LLC QuantorForm, Moscow, Russia*	$14^{50} – 15^{20}$
9. Numerical modeling and development of new hybrid metal forming methods ***Alexander Pesin***, *Nosov Magnitogorsk State Technical University, Russia*	$15^{20} – 15^{50}$
Tour around NMSTU Science Park (Meeting point: Main entrance, 38 Lenin str.)	$16^{00} – 17^{00}$
Dinner café "Have Lunch at Lilly's", 26, Lenin street (by invitation)	$18^{00} – 21^{00}$

Wednesday, 5th June 2019

Workshops

WORKSHOP: Cross-disciplinary solutions in advanced materials engineering (iSmart-Metallurgy)

(9^{30}-13^{00}, NMSTU conference room (231), 38 Lenin str.)
Reports language: English
Moderator: Marina Polyakova, DSc, professor

1. The Way to Improve the Complex of Mechanical Characteristics of Drawn Steel Wire *Alexander Gulin* *Nosov Magnitogorsk State Technical University, Magnitogorsk (Russia)*	9^{30}-9^{45}
2. Implementation of the Universal Interface that Allows the Communication Between Many Models to Perform Hot Strip Rolling Schedules *Grzegorz Smyk* *AGH University of Science and Technology, Krakow (Poland)*	9^{45}-10^{00}
3. Severe Plastic Deformation of Magnesium by Methods of Lateral and Back Extrusion at Low Temperatures *Daria Komkova* *Institute of Metal Physics, Ural Branch, Russian Academy of Sciences, Yekaterinburg (Russia)*	10^{00}-10^{15}
4. Development of Technology for Obtaining Wires of Electrotechnical Purpose from Alloys of the Al-REM System Received by Using Methods of Combined Processing *Denis Voroshilov* *Siberian Federal University, Krasnoyarsk (Russia)*	10^{15}-10^{30}
5. The Change of the Defective Structure of Annealed Nickel under the Action of Ultrasonic Treatment *Elvina Shayakhmetova* *Institute for Metals Superplasticity Problems, Ufa (Russia)*	10^{30}-10^{45}
6. Study the Influence of the Pre-Finish Caliber Form on the Effectiveness of the Grooves Filling in the Finishing Pass During Reinforcing Steel Rolling *Evgeny Panin* *Karaganda State Industrial University, Temirtau (Kazakhstan)*	10^{45}-11^{00}
7. Research on Dynamic Recrystallization Softening During a Hot Upsetting *Alexey Ishimov* *Nosov Magnitogorsk State Technical University, Magnitogorsk (Russia)*	11^{00}-11^{15}
8. Study of Steel Resistance to Plastic Deformations within a Broad Temperature Range for Pipe Steels *Al-Khuzai Akhmed Salim Oleivi* *South Ural State University, Chelyabinsk (Russia)*	11^{15}-11^{30}
9. Study of Layer Deformations when Rolling Five-Layer Steel-Aluminum Composite Materials St3Sp+AMg3 *Denis Salikhyanov* *Ural Federal University named after the First President of Russia B.N. Yeltsin, Yekaterinburg (Russia)*	11^{30}-11^{45}
10. Improving the Rolling Process of Workpieces with Internal Defects *Evgeniya Pozhidaeva* *Nosov Magnitogorsk State Technical University, Magnitogorsk (Russia)*	11^{45}-12^{00}
11. The Study of the Closure of Internal Defects under Radial-Shear Rolling Using FEM Simulation *Gulden Irgebay* *Rudny Industrial Institute, Rudny (Kazakhstan)*	12^{00}-12^{15}

12. Finite-Element Modeling of the Strain State of Aluminum Alloys in Process by the Method of ARB Olesya Biryukova *Nosov Magnitogorsk State Technical University, Magnitogorsk (Russia)*	12^{15}-12^{30}
13. Broadband Hot Rolling Mill Back-Up Rolls Failure Multiparameter Model and Ways to Increase their Durability Based on the Kinetic Approach to the Material Destruction *Polina Makarova* *JSC Magnitogorsk Gipromez, Magnitogorsk (Russia)*	12^{30}-12^{45}

WORKSHOP: Innovative Technology and Materials in Metal Forming

(14^{00}-17^{00}, NMSTU conference room (231), 38 Lenin str.)

Reports language: Russian

Moderator: Denis Chikishev, PhD (Eng.), Associate Professor

1. Development of Treatment Modes and Study of Mechanical Properties of Deformed Semi-Finished Products from AL-ZR Alloys Manufactured by Combined Casting And Extrolling *Alexander Durnopyanov* *Siberian Federal University, Krasnoyarsk (Russia)*	14^{00}-14^{15}
2. Influence of round billet temperature on the structure and breakup of grinding balls *Iliyas Galimyanov* *EVRAZ Nizhny Tagil Metallurgical Plant, Nizhny Tagil (Russia)*	14^{15}-14^{30}
3. Application of Simufact Forming Software to Create a Roll Forming Machine Model *Andrey Tolkushkin* *Ural Federal University named after the First President of Russia B.N. Yeltsin, Yekaterinburg (Russia)*	14^{30}-14^{45}
4. Solder Alloy POIN-52: Study of the Process and Development of the Technology for Small-Batch Wire Production *Lev Glebov* *South Ural State University, Chelyabinsk (Russia)*	14^{45}-15^{00}
5. Influence of Sizing Reduction on the Prestressed Strand Quality *Alexander Krivtsov* *Nosov Magnitogorsk State Technical University, Magnitogorsk (Russia)*	15^{00}-15^{15}
6. Research on the Formation of End Sections when Reducing Pipes *Denis Akhmerov* *South Ural State University, Chelyabinsk (Russia)*	15^{15}-15^{30}
7. Designing the Electric Drive of the Torch Cutting Machine in the Rolling Shop of Jsc Ural Steel *Yaroslav Makarov* *Novotroitsk Branch, National University of Science and Technology "Moscow Institute of Steel and Alloys", Novotroitsk (Russia)*	15^{30}-15^{45}
8. Deformation Resistance of Fine Silver (99.99%) at Great Plastic Deformations *Danil Khamatov* *Ural Federal University named after the First President of Russia B.N. Yeltsin, Yekaterinburg (Russia)*	15^{45}-16^{00}
9. Electrolytic Polishing of Samples for EBSD Analysis *Ekaterina Lopatina* *Nosov Magnitogorsk State Technical University, Magnitogorsk (Russia)*	16^{00}-16^{15}

10. Development of an Integrated Model for Failures of Joints of Universal Spindles and Methods to Increase Their Service Life Applying a Kinetic Approach to Material Damage *Dmitry Smolkin* *Nosov Magnitogorsk State Technical University, Magnitogorsk (Russia)*	16^{15}-16^{30}
11. Studies on the Influence of Tube Cold Rolling Process Parameters on a Distribution of the Tube Wall Thickness Reduction Between Forward and Backward Strokes of The Stand *Stanislav Pilipenko* *Polotsk State University, Polotsk (Belarus)*	16^{30}-16^{45}
12. Evaluation of the Surface Condition of Wire Produced by Semi-Continuous Drawing from Molten Silver *Alexander Pervukhin* *JSC Yekaterinburg Non-Ferrous Metals Processing Plant, Verkhnyaya Pyshma (Russia)*	16^{45}-17^{00}

WORKSHOP: Fundamental Problems of Metal Forming during Transition to Innovative Technology

(***14^{00}-17^{00}***, Minor assembly hall, 38 Lenin str.)

Reports language: Russian

Moderator: Ksenia Pivovarova, PhD (Eng.), Associate Professor

1. Computer Simulation of the Rail Joint Straightening Process in the Shape Straightening Machine *Sergey Mylnikov* *Ural Federal University named after the First President of Russia B.N. Yeltsin, Yekaterinburg (Russia)*	14^{00}-14^{15}
2. Non-Destructive Testing Methods for Mechanical Properties of Carbon Steel Flat Rolled Products *Alexey Shiryaev* *Perm National Research Polytechnic University, Perm (Russia)*	14^{15}-14^{30}
3. Ferrous Scrap Recycling on the Radial-Displacement Rolling Mill *Oksana Salko* *Rudny Industrial Institute, Rudny (Kazakhstan)*	14^{30}-14^{45}
4. Steel Strength Improvement Method *Tet Paing* *Moscow State University of Technology STANKIN, Moscow (Russia)*	14^{45}-15^{00}
5. Outlining the Block Diagram of the Concept of Two-Stage Optimization of the Roll Pass Design for Rolling Channels *Ekaterina Ustinova* *Ural Federal University named after the First President of Russia B.N. Yeltsin, Yekaterinburg (Russia)*	15^{00}-15^{15}
6. Influence of the Non-Equiaxial Cellular Structure Geometry on Properties of Finished Products from a Titanium Alloy *Svyatoslav Grekhov* *Ural Federal University named after the First President of Russia B.N. Yeltsin, Yekaterinburg (Russia)*	15^{15}-15^{30}
7. Increasing Ductility Properties of Continuously Annealed Tinplate at PJSC MMK *Sergey Gubanov* *PJSC Magnitogorsk Iron & Steel Works, Magnitogorsk (Russia)*	15^{30}-15^{45}
8. Analysis of Non-Uniform Thickness Occurred when Stamping Branch Pipes from Stainless Steel 08KH18N10T *Denis Salikhyanov* *Ural Federal University named after the First President of Russia B.N. Yeltsin, Yekaterinburg (Russia)*	15^{45}-16^{00}

9. Outlining the Block Diagram of the Hot Rolling Mill Technical System *Elena Shiryaeva* *Nosov Magnitogorsk State Technical University, Magnitogorsk (Russia)*	*16^{00}-16^{15}*
10. Reconditioning of the Worn Surface of Roll Necks by Applying a Direct Metal Laser Melting Method *Vitaly Bykov* *South Ural State University, Chelyabinsk (Russia)*	*16^{15}-16^{30}*
11. Main Approaches and Experience of the Application of Digital Technologies in Pipe and Tube Production *Evgeny Shkuratov* *South Ural State University, OJSC RosNITI, Chelyabinsk (Russia)*	*16^{30}-16^{45}*
12. Experimental and Theoretical Studies on Free Spreading of Titanium Alloy VT6 *Alexander Postylyakov* *Ural Federal University named after the First President of Russia B.N. Yeltsin, Yekaterinburg (Russia)*	*16^{45}-17^{00}*
13. Studies on the Reasons for Surface Defects in Steel Products Produced by the CONFORM Continuous Pressing Method *Dmitry Kovin* *Ural Federal University named after the First President of Russia B.N. Yeltsin, Yekaterinburg (Russia)*	*17^{00}-17^{15}*

Thursday, 6th June 2019

Tour around Magnitogorsk Iron and Steel Works (Meeting point: NMSTU courtyard, 38 Lenin str.)	9^{00}-14^{00}
Closing Plenary and Award Giving (Minor assembly hall, 38 Lenin str.)	14^{00} - 15^{00}
City tour	15^{00}-17^{00}

Friday, 7th June 2019

Entertainment Program – Trip to the Metallurg - Magnitogorsk ski resort	9^{00} – 13^{00}
Departure of the non-local participants	

Workshop Results 2019: