NOSOV MAGNITOGORSK
STATE TECHNICAL UNIVERSITY

The 3rd International Youth Workshop

MAGNITOGORSK ROLLING PRACTICE 2018

5-8 june

PROGRAM BOOK

Sponsored by the Russian Foundation
for Basic Research

Conference organized by

Nosov Magnitogorsk State Technical University,
Magnitogorsk

South Ural State University
(national research university),
Chelyabinsk

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

Siberian Federal University,
Krasnoyarsk

Ufa State Aviation Technical University,
Ufa

Perm National Research Polytechnic University,
Perm

Russian Research Institute of the Tube & Pipe Industries,
Chelyabinsk

Karaganda State Industrial University,
Temirtau, Kazakhstan

Dear colleagues!

On behalf of the organizing committee we are delighted to welcome you to the 3rd International Youth Conference ***Magnitogorsk Rolling Practice***.

It was 2014 when the researcher community at the Nosov Magnitogorsk State Technical University came up with an idea to organize a youth forum that would focus on fundamental and applied problems of metal and alloy forming.

The idea of making such a youth conference found an enthusiastic support with the academic, business and student communities in Russia, CIS and farther abroad. The importance of the problems covered by the conference is confirmed by a continuous support from the Russian Foundation for Basic Research and an ever expanding geography of participants. Many of the young researchers who presented their reports at the previous forums successfully defended their PhD theses afterwards.

The agenda of the conference this year includes reports by prominent scientists from Russia and abroad, the opening of the international laboratory *Mechanics of Gradient Nanomaterials*, subject-specific workshops and a tour around Magnitogorsk Iron and Steel Works. Authors of the best reports will receive awards and their papers will be published in the partner journals indexed in Scopus and included in the List of Russian Peer-Reviewed Titles.

We are confident that the conference will give momentum to a wider and tighter collaboration between young researchers dealing with metal and alloy forming and will help build new researcher teams capable of tackling most challenging tasks.

The organizing committee would like to greatly thank all the participants for their contribution to the course of the conference.

We hope you will have a truly fulfilling time in the guest-friendly city of Magnitogorsk.

Chairperson
of the Organizing
Committee

Aleksey 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 (Univeristy of Padua, Italy);

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

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

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

A.V. Vydrin – deputy general director responsible for research, professor, D.Sc. (Eng.) (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);

A.A. Bogatov – professor, D.Sc. (Eng.) (Institute of Material Studies and Metallurgy, Yeltsin Ural Federal University, Yekaterinburg, 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.

The Organizing Committee

Chairman of the Organizing Committee – Alexey G. Korchunov

Deputy Chairman of the Organizing Committee – Eduard Yu. Mescheryakov

A.S. Kharchenko – PhD (Eng.), associate professor at the Department of Metallurgy and Casting.

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.

A.S. Savinov – D.Sc. (Eng.), professor, director of Institute of Metallurgy, Mechanical Engineering and Materials Processing.

D.O. Pustovoytov – PhD (Eng.), associate professor at the Department of Materials Processing.

A.E. Gulin – PhD (Eng.), senior research fellow at NMSTU.

Contacts:

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Tuesday, 5th June 2018

Registration (NMSTU main building, 38 Lenina prospekt, lobby in front of the assembly hall)	$10^{00} – 11^{00}$
Plenary Session (NMSTU conference room (231), 38 Lenina prospekt)	
1. Rector's opening speech ***Mikhail Chukin***	$11^{00} – 11^{05}$
2. Welcome speech of Chairperson of the Organizing Committee ***Aleksey Korchunov***, *Vice Rector for International Affairs, NMSTU*	$11^{05} – 11^{10}$
3. Advanced Metal Forming Techniques: Incremental Sheet Forming ***Puneet Tandon***, *PDPM Indian Institute of Information Technology, Design and Manufacturing Jabalpur, Jabalpur, Madhya Pradesh, India*	$11^{10} – 11^{40}$
4. Thermomechanical treatment for Advanced High Strength Steel & Ultra High Strength Steel production ***Manuele Dabala***, *University of Padua, Italy*	$11^{40} – 12^{10}$
5. Tendencies in the development of new methods for carbon steel wire manufacturing ***Marina Polyakova***, *Nosov Magnitogorsk State Technical University*	$12^{10} – 12^{40}$
Photo Session (Main entrance, 38 Lenina prospekt)	$12^{50} – 13^{00}$
Break (38 Lenina prospekt, room 236)	$13^{00} – 14^{00}$
Presentation of International Laboratory "Mechanics of gradient nanomaterials" (NMSTU conference room (231), 38 Lenina prospekt)	
6. Welcome speech ***Vladislav Speicher***, *Inconsult K, Moscow, Russia*	$14^{00} – 14^{05}$
7. Organizational structure and goals of new laboratory in NMSTU ***Alexander Zhilyaev***, *Institute for Metals Superplasticity Problems of the Russian Academy of Sciences, Ufa, Russia*	$14^{05} – 14^{30}$
8. Development in the processing of ultrafine-grained and gradient nanomaterials ***Terence Georg Langdon***, *University of Southampton, United Kingdom*	$14^{30} – 15^{00}$
9. Perspectives of industrial application of severely deformed metals ***Jose Maria Cabrera Marrero***, *Polytechnic University of Catalonia, Barcelona, Spain*	$15^{00} – 15^{30}$
10. Mechanics of Advanced Bulk Nanomaterials for Innovative Engineering Applications ***Ruslan Valiev***, *Saint Petersburg State University, Russia*	$15^{30} – 16^{00}$
Tour around NMSTU Science Park (Meeting point: Main entrance, 38 Lenina prospekt)	$16^{00} – 17^{00}$
Dinner Santa café, 47/2 Karla Marksa str. (by invitation)	$18^{30} – 20^{00}$

Wednesday, 6th June 2018
Workshops

WORKSHOP: Innovative Technology and Materials in Metal Forming (Conference room, 38 Lenina prospekt)

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

1. New research equipment at the Department of Metal Forming, UrFU *A.O. Tolkushkin* *Ural Federal University named after the First President of Russia B.N. Yeltsin, Yekaterinburg*	9^{30}-9^{45}
2. Understanding the possibility to control the final properties of temper-rolled hot band *E.M. Medvedeva* *Nosov Magnitogorsk State Technical University, Magnitogorsk*	9^{45}-10^{00}
3. Developing the innovative technology of hot and cold rolling of semi-finished sheets made from new scandium inoculated aluminium alloy *O.V. Yakivyuk* *Siberian Federal University, Krasnoyarsk*	10^{00}-10^{15}
4. Process analysis and optimization in the production of railway rails on a modern rail and universal beam mill *A.A. Umansky* *Siberian State Industrial University, Novokuznetsk*	10^{15}-10^{30}
5. New technology of producing large parts with curved surfaces on a plate mill using a combined rolling and stamping process *I.A. Pesin* *Nosov Magnitogorsk State Technical University, Magnitogorsk*	10^{30}-10^{45}
6. Identifying the optimum roll design for U-section production *E.I. Ustinova* *Ural Federal University named after the First President of Russia B.N. Yeltsin, Yekaterinburg*	10^{45}-11^{00}
7. Developing the low-waste technology of draftless hot die forging of weld neck flanges using a combined expansion-and-extrusion pattern *S.S. Strugov* *South Ural State University (national research university), Chelyabinsk*	11^{00}-11^{15}
8. Examining the current status and ways to enhance the quality of tinplate products at Magnitogorsk Iron & Steel Works (MMK) *S.A. Gubanov* *Magnitogorsk Iron & Steel Works PJSC, Magnitogorsk*	11^{15}-11^{30}
9. Analysis of the flange forging technique using computer simulation tools *D.R. Salikhyanov* *Ural Federal University named after the First President of Russia B.N. Yeltsin, Yekaterinburg*	11^{30}-11^{45}
10. How the lubrication pattern of the work roll-backup roll friction pair changes the friction torque and wear as observed	11^{45}-12^{00}

through laboratory modelling exercise *M.V. Kharchenko* *Nosov Magnitogorsk State Technical University, Magnitogorsk*	
11. Understanding the impact of heat treatment on the mechanical properties of sparingly alloyed steel of the MAGSTRONG W700 type *A.S. Kuznetsova* *Nosov Magnitogorsk State Technical University, Magnitogorsk*	12^{00}-12^{15}
12. Innovative railway car hollow axle production process *S.M. Kriskovich* *National University of Science and Technology "Moscow Institute of Steel and Alloys", Moscow*	12^{15}-12^{30}
13. Understanding the tube reduction process in a three-roll piercing mill *A.S. Budnikov* *National University of Science and Technology "Moscow Institute of Steel and Alloys", Moscow*	12^{30}-12^{45}

WORKSHOP: Development of Advanced Metals and Alloys Processing Theory and Technology (Minor assembly hall, 38 Lenina prospekt)

Moderator: Aleksandr Gulin, PhD (Eng.)

1. Raising the competitive advantage of spring wire by improving the production process *N.Yu. Smetneva* *Nosov Magnitogorsk State Technical University, Magnitogorsk*	9^{30}-9^{45}
2. Metal flow in the deformation zone during the CONFORM continuous extrusion of copper bus bars *R.V. Fominykh* *Ural Federal University named after the First President of Russia B.N. Yeltsin, Yekaterinburg*	9^{45}-10^{00}
3. Understanding the evolution of microstructure in the aisi1015 steel during radial-displacement rolling using the SIMUFACT.FORMING software and the MATILDA database *A.S. Arbuz* *Karaganda State Industrial University, Temirtau, Kazakhstan*	10^{00}-10^{15}
4. Automatic laboratory-scale draw bench for studying the wire drawing process *S.S. Faizov* *South Ural State University (national research university), Chelyabinsk*	10^{15}-10^{30}
5. Ways to improve the competitiveness of large diameter carbon steel wire *M.Yu. Usanov* *Nosov Magnitogorsk State Technical University, Magnitogorsk*	10^{30}-10^{45}
6. Modelling the pressure moulding of rod ends *A.R. Vakhitov* *Belmag JSC, Magnitogorsk*	10^{45}-11^{00}
7. Improving the quality of vacuum arc deposited coatings through the development of indicators recommended for standardization *M.I. Yansaitova*	11^{00}-11^{15}

Ufa State Aviation Technical University, Ufa	
8. Simulation of forming operations in the production of forged and welded piping parts *K.S. Torgonin* *South Ural State University (national research university), Chelyabinsk*	11^{15}-11^{30}
9. Choosing competitive processes to produce bundled reinforcing steel *I.M. Petrov* *Beloretsk Branch of Nosov Magnitogorsk State Technical University*	11^{30}-11^{45}
10. Optimised cold forging process to produce rail splice bolts with specified mechanical properties *A.R. Bazykov* *MMK-METIZ OJSC, Magnitogorsk*	11^{45}-12^{00}
11. Simulation-based optimisation of the process to produce steel sheets for die forging *I.S. Demetrashvili* *National University of Science and Technology "Moscow Institute of Steel and Alloys", Moscow*	12^{00}-12^{15}
12. Computer simulation of hollow sleeve and pipe drawing *S.A. Trufanov* *National University of Science and Technology "Moscow Institute of Steel and Alloys", Moscow*	12^{15}-12^{30}

WORKSHOP: Fundamental Problems of Metal Forming during the Transition to Innovative Technology (Conference room, 38 Lenina prospekt)

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

1. Examining the strain state of the aluminium alloys 1070, 2024 and 5083 during asymmetric and pack rolling with the help of the finite element method *O.D. Biryukova* *Nosov Magnitogorsk State Technical University, Magnitogorsk*	14^{00}-14^{15}
2. Estimating the wear of hammer dies during hot die forging with the help of computer modelling *D.R. Salikhyanov* *Ural Federal University named after the First President of Russia B.N. Yeltsin, Yekaterinburg*	14^{15}-14^{30}
3. Advanced information systems for improving the efficiency of steel sections production *S.Yu. Sarancha* *Nosov Magnitogorsk State Technical University, Magnitogorsk*	14^{30}-14^{45}
4. Examining the rheological properties of deformed semi-finished products made from low-ductility aluminium alloys by combined processing *A.P. Samchuk* *Siberian Federal University, Krasnoyarsk*	14^{45}-15^{00}

5. Experimental study of the plastic strength of chromium EAF steel for rail production *L.V. Dumova* *Siberian State Industrial University, Novokuznetsk*	15^{00}-15^{15}
6. Understanding the impact of nickel on the structural phase transformations and properties of high-strength cold-resistant steel *M.S. Gushchina* *Nosov Magnitogorsk State Technical University, Magnitogorsk*	15^{15}-15^{30}
7. Understanding the stress-strain state of a ball-shaped workpiece going through a ball-rolling mill 30-60 *E.A. Panin* *Karaganda State Industrial University, Temirtau, Kazakhstan*	15^{30}-15^{45}
8. Reducing the thermal effect of rolling on the environment *D.D. Khamatov* *Ural Federal University named after the First President of Russia B.N. Yeltsin, Yekaterinburg*	15^{45}-16^{00}
9. Method of predicting the life of QUARTO rolling mills *P.V. Makarova* *Nosov Magnitogorsk State Technical University, Magnitogorsk*	16^{00}-16^{15}
10 Understanding the technical aspects in the production of high-strength dual-phase steel *P.S. Tarasov* *Nosov Magnitogorsk State Technical University, Magnitogorsk*	16^{15}-16^{30}
11. Understanding the technical aspects in the production of high-quality rolled steel sheets for automotive industry in Cold Mill 2500 *S.A. Kondrashov* *Nosov Magnitogorsk State Technical University, Magnitogorsk*	16^{30}-16^{45}
12. Practical experience of producing centrifugal-cast rolls for hot rolling mills at the Kushva Roll Manufacturing Factory *I.Kh. Tukhvatulin* Kushva Roll Manufacturing Factory, Kushva	16^{45}-17^{00}

Thursday, 7th June 2018

Tour around Magnitogorsk Iron and Steel Works (Meeting point: NMSTU courtyard, 38 Lenina prospekt)	9^{00}
Lunch	13^{00} - 14^{00}
Closing Plenary and Award Giving (Minor assembly hall, 38 Lenina prospekt)	14^{00} - 15^{00}

Friday, 8th June 2018

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