REPORT ON IMPLEMENTATION OF MMATENG PROJECT for the first 6 months
MMATENG work group

Prof. Alexey Korchunov, Doctor of Technical Sciences, Vice-Rector for International Affairs, MSTU

Prof. Natalia Koptseva, Doctor of Technical Sciences, Coordinator, MSTU
Target institute, faculty and departments responsible for implementation of the plan and MMATENG outputs and outcomes

- Metallurgy, Materials Science and Metal Working Institute (MMMI)
- Standardization, Chemistry and Bioengineering Faculty (SCBF)
- Departments:
  - Foundry and Materials Science (FMS)
  - Mechanical and Metallurgical Process Engineering (MMPE)
  - Ferrous Metallurgy (FM)
  - Technology, Certification and Service of Vehicles (TCSV)
  - Chemistry Department

Related universities and nonacademic partners involved in the project

- Novotroitsk Branch of the National University of Science and Technology MISiS
- LLC Research and Manufacturing Plant Foundry and Metallurgy Technologies
- OJSC MMK-METIZ
- CJSC MRK
Key provisions of the developed internal plan of activities under MMATENG project

1. To form the project team.
2. To disseminate information about the project.
3. To work out a questionnaire and carry out surveys of students.
4. To work out questionnaires and carry out surveys of nonacademic partners.
5. To analyze and select current related curricula and disciplines to be upgraded and implemented in training.
6. To upgrade new curricula/disciplines.
7. To prepare rooms and establish Materials Information Technology Labs (MITL).
8. To prepare rooms and establish the Material Engineering Service Office (MESO).
9. To prepare for accreditation on an institutional level and implement upgraded curricula/disciplines in training.
10. To select teachers to participate in trainings in material engineering.
11. To provide training, retraining and master classes for teaching staff members of the project and mentors - personnel of industrial partners.
12. To work out educational literature to be published.
13. To acquire educational literature.
Activities related to quality control and quality assurance of MMATENG project

• A weekly meeting of the project work group is carried out on issues related to implementation of the internal plan of activities.
• On 29 April 2014 we held a meeting of the project work group with employers and nonacademic partners to discuss employers’ requirements for university graduates.
• We have developed a quality assurance procedure for development and implementation of new teaching materials.
• Regularly a progress of the project is discussed at meetings of the rector’s office.

• On 14 May 2014 and 04 June 2014 we held videoconferences of the project workgroup with Mr. Arnold Sterenharz (ECM-office, Berlin) to discuss issues related to a report on project implementation for 6 months and preparation of financial documents.
Criteria for selection and preparation of teaching staff members to participate in training courses

1. We **have set** criteria for selection of teaching staff members to participate in training courses organized in EU universities / TUB (DE), KU Leuven (BE), KP (PL) in 2015:
   - Employment with the university (a labor contract is valid for 3 years or longer)
   - Level of English (B1, B2)
   - Academic degree, academic title
   - Teaching experience
   - Experience of lecturing on project related disciplines
   - Relation of a research paper to the subject of the project
   - Experience of participating in international projects
   - Project related papers on teaching and studies
   - Communication skills

2. We **have allocated** teachers to subject matters of disciplines to be developed as part of implementation of MMATENG project.

3. We **have selected** teachers to participate in training courses.

4. We **have formed** groups of project participants to improve language competences.

5. We **have arranged** courses on improvement of language competences held in the academic year 2013/14.
Preparation for participation in trainings for teachers at EU universities

Teachers selected for participation in trainings

Assoc. Prof. Marina Polyakova, Candidate of Technical Sciences, Associate Professor of the Mechanical and Metallurgical Process Engineering Department

Assoc. Prof. Evgeny Shekunov, Candidate of Technical Sciences, Associate Professor of the Foundry and Materials Science Department

Marina Potapova, Candidate of Technical Sciences, Associate Professor of the Ferrous Metallurgy Department

Alexander Gulin, postgraduate, Junior Research Assistant of the Mechanical and Metallurgical Process Engineering Department

Alexey Ishimov, postgraduate, Junior Research Assistant of the Mechanical and Metallurgical Process Engineering Department

Dmitry Konstantinov, postgraduate of the Mechanical and Metallurgical Process Engineering Department, Lead Specialist of the International Affairs Office

Dmitry Chukin, postgraduate, Junior Research Assistant of the Foundry and Materials Science Department
Survey objective: collection of information about students’ attitude to MMATENG.

Questionnaire survey tasks:
- identify students’ levels of information and information content about the project;
- determine key sources of sharing information about the project among students;
- identify students’ opportunities for participation in the project;
- determine students’ opinion on the quality of disciplines on materials science taught at the university.

We developed questionnaires. We carried out a complete survey of first to fourth-year students of the Institute of Metallurgy, Machinery and Material Working.

In the survey students trained in “Metallurgy” and “Materials Science and Materials Engineering” took part. Totally 51 students were surveyed.

Conclusions
- Almost three-fourths of respondents are informed about TEMPUS-MMATENG.
- The survey revealed a high quality of disciplines on materials science taught at NMSTU.
In April 2014 we issued, placed informational flyers and posters regarding TEMPUS MMATENG on bulletin boards, and distributed flyers among MSTU students.

Flyer size: A4
Printed on 21.05.14.
Circulation: 100 copies

Poster size: A1
Printed on 21.05.14
Circulation: 6 copies

Flyer forthcoming in September 2014
Project information dissemination

Creation of a webpage regarding MMATENG on the website of MSTU

http://www.youtube.com/watch?v=Xzf3OSfh9eM

LIST of Internet links to information about implementation of TEMPUS MMATENG project at MSTU
Date and venue:
29 April 2014.
Video conference room, Nosov MSTU
(38, Lenin Street, lecture room 233)

Objective of the presentation
Introduction for potentially interested people and
target project participants to the project’s concept,
role and new opportunities of MSTU as
the Tempus program participant.

Agenda
1. Opening video address of main MMATENG project coordinators.
2. Presentation by A.G. Korchunov, Vice-Rector for International Affairs,
on a basic concept and objectives of the Tempus program.
3. Information statement by Assoc. Prof. M.A. Polyakova on
the composition and team of the consortium.
4. Report by Prof. N.V. Koptseva on objectives, tasks, outlook and
role of MSTU as part of MMATENG.
5. Q&A session between MSTU project coordinators and visitors.

People invited to the meeting
1. Coordination team of the project at MSTU.
2. Representatives of target divisions of the university
(directors of institutes, deans of faculties, deputy
directors and deans for international affairs, teachers, students).
3. Representatives of local potentially interested organizations.
5. Everyone interested.

Results of the event
The presentation provided the target group of the project with a general concept and ideas of the Tempus program as part of international educational environment and with key features of MMATENG Project, representatives of organizations participating in the consortium. A separate report covered specific features of participation of MSTU in MMATENG Project detailing new curricula, potential opportunities for students and researchers and outlook for cooperation in education between partner organizations. Participants of the presentation included representatives of all levels of the MSTU educational structure engaged in the project, main international project coordinators, representatives of nonacademic partners of the project and mass media. The presentation was of great interest among the target academic group as well as mass media.

Link to a television report on the event: http://www.youtube.com/watch?v=Xzf3OSfh9eM
Project, открывая возможность

In March, the presentation of the TEMPUS project (Program in Transnational Education and Research in Materials Engineering) took place at the University of Belgrade, Serbia. The project aims to improve the quality of education and research in materials engineering in the region. The event was attended by professors, students, and representatives from various universities and research institutions.

The project is funded by the European Union and is supported by the TEMPUS program of the European Commission. The project is led by the University of Belgrade, with participation from universities in Serbia, Romania, and Bulgaria.

In addition to the presentation, there were discussions on the importance of international cooperation in education and research. The event was a success, and the participants expressed their enthusiasm for the future of the project.

Link to a television report on the presentation of the project at MSTU
http://www.youtube.com/watch?v=Xzf3OSfh9eM

Uploaded on 4 May 2014
### Analysis of current curricula and disciplines related to the subject of MMATENG

<table>
<thead>
<tr>
<th>Items</th>
<th>BA</th>
<th>MA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of current curricula in the field of MMATENG (total)</td>
<td>16</td>
<td>7</td>
</tr>
<tr>
<td>Number of curricula to be analyzed</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>Number of analyzed curricula</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>Number of curricula to be upgraded/modernized</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>Number of current disciplines in the field of MMATENG (total)</td>
<td>over 300</td>
<td>over 150</td>
</tr>
<tr>
<td>Number of disciplines to be analyzed</td>
<td>252</td>
<td>46</td>
</tr>
<tr>
<td>Number of analyzed disciplines</td>
<td>252</td>
<td>46</td>
</tr>
<tr>
<td>Number of disciplines to be upgraded/modernized</td>
<td>16</td>
<td>7</td>
</tr>
</tbody>
</table>

- **We have analyzed** 15 current MMATENG related curricula containing 298 work programs and **selected** 23 disciplines included in licensed BA and MA educational program on “Metallurgy” and “Materials Science and Materials Engineering” for further upgrading.
- **We have developed** a schedule of upgrading which provides for accreditation of developed educational programs and the schedule of their implementation (from February of 2015 to September of 2016) in training at 5 departments: Foundry and Materials Science; Mechanical and Metallurgical Process Engineering; Ferrous Metallurgy of the Institute of Metallurgy, Materials Science and Metal Working; Chemistry; Technology, Certification and Service of Vehicles of the Faculty of Standardization, Chemistry and Biochemistry.
- An analytical report (35 pages, 5 tables) is issued
### List of disciplines to be upgraded and implemented in training at MSTU

#### Core curricula

<table>
<thead>
<tr>
<th>No.</th>
<th>Discipline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Materials science</td>
</tr>
<tr>
<td>2</td>
<td>General materials science and materials engineering</td>
</tr>
<tr>
<td>3</td>
<td>Simulation and optimization of materials properties and processes</td>
</tr>
<tr>
<td>4</td>
<td>Selection of heat treatment technologies and equipment</td>
</tr>
<tr>
<td>5</td>
<td>Operational materials</td>
</tr>
<tr>
<td>6</td>
<td>Mechanics of materials and design principles</td>
</tr>
<tr>
<td>7</td>
<td>Modern structural and tool materials</td>
</tr>
<tr>
<td>8</td>
<td>Modern materials research methods</td>
</tr>
<tr>
<td>9</td>
<td>Modern methods of analysis of the structure and metal and alloy properties</td>
</tr>
<tr>
<td>10</td>
<td>Materials research methods</td>
</tr>
<tr>
<td>11</td>
<td>Methods and tools for studies, analysis and diagnostics of nanomaterials</td>
</tr>
<tr>
<td>12</td>
<td>Mechanical properties of metals</td>
</tr>
<tr>
<td>13</td>
<td>Physics and chemistry of metal protection against corrosion</td>
</tr>
<tr>
<td>14</td>
<td>Corrosion and metal protection</td>
</tr>
<tr>
<td>15</td>
<td>Metallurgical and machine-building waste treatment</td>
</tr>
<tr>
<td>16</td>
<td>Production waste treatment and disposal</td>
</tr>
<tr>
<td>17</td>
<td>Processes and equipment for manufacturing of nanomaterials</td>
</tr>
<tr>
<td>18</td>
<td>Fundamentals of nanotechnology</td>
</tr>
<tr>
<td>19</td>
<td>Fundamentals of heat treatment processes at machinery plants</td>
</tr>
<tr>
<td>20</td>
<td>Fundamentals of heat treatment processes at metallurgical plants</td>
</tr>
</tbody>
</table>

#### Transferrable curricula

<table>
<thead>
<tr>
<th>No.</th>
<th>Discipline</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>Innovations management</td>
</tr>
<tr>
<td>22</td>
<td>Quality management</td>
</tr>
<tr>
<td>23</td>
<td>Management and marketing</td>
</tr>
</tbody>
</table>
The content of the discipline “Nano materials Technologies”

<table>
<thead>
<tr>
<th>Themes</th>
<th>Contact work hours</th>
<th>Time and tasks for individual work</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lect.</td>
<td>Practic. works</td>
</tr>
<tr>
<td>1. General characteristics of nanotechnologies, nanomaterials and nanostructured materials</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2. Techniques for synthesis and processing of nanomaterials and nanostructured materials</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>3. Basic research methods of nanomaterials nanostructured materials</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>4. Deformation methods of producing bulk nanostructured materials</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>5. Structure and mechanical properties of bulk nanostructured nanomaterials</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>6. Stability of bulk nanostructured nanomaterials to thermal influences</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>7. Application of nanomaterials and nanostructured materials</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>36</td>
<td>15</td>
</tr>
</tbody>
</table>

Laboratory works themes:

1. "The evolution of structure and mechanical properties in the structura carbon steels during deformation nanostructuring by method of equal-channel angular pressing"
2. "The evolution of structure and mechanical properties after annealing of the structural ultrafine grained steel, nanostructured by method of equal-channel angular pressing"
3. "Modern diagnostics of the structure and properties and fisical modelling obteining of UFG structure in steels"
Thank you for your attention!