

Материал
Золото
Удельная теплоемкость, Дж/кг°С
130
Плотность, 10 ⁻⁴ , кг/см ³
193
Температура плавления, °С
1064
Температура кипения, °С
2947
Отражательный коэффициент
0,849
Материал
Натрий
Удельная теплоемкость, Дж/кг°С
1220
Плотность, 10 ⁻⁴ , кг/см ³
9,68
Температура плавления, °С
98
Температура кипения, °С
886
Отражательный коэффициент
0,975
Сварка не возможна!

Рис. 5. Сообщение в результате работы программы о невозможности сварки

Таким образом выполнено компьютерное моделирование в программе Delphi для определения диапазона допустимых плотностей при лазерной сварке.

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Innovative technologies in the development of modern education

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The article explores innovative approaches to education for foreign students in technical universities, including the creation of a Digital educational plat-

form in Russian. The methodology for adapting students, ways to attract users and the structure features of the platform developed by the National Research University «Moscow Power Engineering Institute» with the support of the Ministry of Education of the Russian Federation are described. Attention to trends in the development of such platforms and their role in the popularization of the Russian language abroad is paid.

Currently, one of the most relevant and dynamically developing areas in the field of education and educational technologies is e-learning and the development of open education courses [1]. Leading universities in Russia and the CIS countries are increasingly involved in the creation and promotion of electronic learning resources, creation of electronic libraries [2]. These things are becoming an integral part of the educational process. Numerous factors, such as COVID-19 [3], are driving the development of these distance learning technologies. This opens up new prospects in the international market. Russia and the CIS countries, having capability in the energy sector, strive to provide high-quality education, especially in the field of engineering [4].

One of the tools for creating an effective learning process is a Digital Educational Platform for the implementation of open education courses in Russian (hereinafter referred to as the Digital educational platform) [5].

In 2020–2022, the idea of creating a Digital educational platform for foreign citizens was worked out at the National Research University «Moscow Power Engineering Institute» (hereinafter – MPEI). The project was launched with grant support under the program «Development of Education» in order to expand access to Russian-language open education and scientific and educational cooperation with other countries.

For achieving the goal of a Digital educational platform for international students creating project, the following tasks were formulated:

- to create a platform for open education courses;
- to hold an event to attract users and partner universities.

At the project development stage, personnel are provided by programmers, designers, course developers and administrators from MPEI. The platform is an information space that provides remote training, access to materials and testing. The resource is available at <https://www.digiteducation.ru>.

The Digital educational platform has a block structure that allows you to create comprehensive courses for various educational tasks.

The first block of courses includes «Russian Language», «English Language» and «Physics». The Russian language is the basis of the platform, necessary for effective user experience. English has been added due to its widespread use and the availability of educational materials in that language. A Physics course is required for basic knowledge before studying technical disciplines.

The first block of courses was combined into the program of Additional Professional Education «Preparation for mastering specialized technical disciplines at the university in Russian».

The second block consists of 7 courses focused on the field of electrical engineering and power engineering: «Theoretical Foundations of Electrical Engineering», «Electrical Power Engineering», «Electric Power Systems and Networks», «Electrical Networks Design», «Power Supply», «Overhead and Cable Lines» and «Electric Power Quality».

The Theoretical Foundations of Electrical Engineering course presents the basic concepts and laws of electrical engineering, as well as methods for solving problems on DC and AC electrical circuits.

The Electric Power Engineering course summarizes knowledge about the generation, transmission, distribution and consumption of electric power, including the calculation of modes, short-circuit currents and relay protection.

The Electric Power Systems and Networks course concerns the preparation of replacement schemes for the main power grid equipment, calculation of steady-state modes and voltage regulation.

The Electrical Networks Design course introduces the choice of electrical equipment and methods of technical and economic comparison of network construction options.

The Power Supply course refers to the characteristics of power for cities and issues of supply reliability.

The Overhead and Cable Lines course introduces the design of power transmission lines.

The Electric Power Quality course describes the characteristics of the power supply system in terms of electromagnetic interference and methods for protecting electrical receivers.

The second block of training courses was combined into the program of Additional Professional Education «Fundamentals of Electrical Power Engineering and Electrical Engineering».

The Digital educational platform combines the best practices of modern distance learning systems and innovative approaches to learning and professional development. The authors identified the main trends of this approach:

The glossary in the Digital Educational Platform is the main assistant for foreign students, helping them master complex technical disciplines. It provides definitions of key terms in Russian and the selected language, and may also include illustrations. Users can search for terms across all training courses and study them individually or all at once. This sharing of courses and glossary creates an efficient learning environment for international students on the platform.

The Digital educational platform is **highly interactive**. For example, in the “Russian language” course, when you hover over a word, you can see its picture

and translation into English. When you click on a letter of the alphabet, you can hear its pronunciation and watch a video showing how the letter is written. A similar interactive approach is used in the rest of the course.

The Digital educational platform offers **high information content and easy navigation**. By clicking on the “More about the platform” button, you will be taken to the About Us page, provides an illustration of the process from idea to project implementation, as well as a brief description.

In the main menu on the left is the News page, where information related to the platform is published, such as hosting events or adding new courses. Here you can read each news in more detail.

When you click on the Learn button on the main page or menu, you will be taken to the «Educational Materials» page, where all training courses are located.

Inside each lesson of the course you will find the structure and content of the lesson, including the blocks «Theory», «Practice», «Test», «Video» and «Application».

The Digital platform provides access to a variety of content, including **video, photo, audio, graphics**, applications and educational games. The “Theory” and “Practice” blocks contain presentations adapted for lectures and practical classes. It is possible to add voiceover from the teacher. The «Video» block contains videos demonstrating the principles of the phenomena being studied or their practical application. The Application section presents educational games that allow you to learn in a playful way. For example, in a physics game, the challenge might be adjusting the speed of a cannon projectile to hit a barrel.

The Digital educational platform offers a Test block for **self-testing**, where users can take a test and, if successful, receive a check mark in front of the corresponding activity.

This integrated approach to learning educational subjects makes the platform exciting and competitive for international students.

It is worth highlighting the site administration block, allows you to easily add, edit and delete content with minimal time. In the future, it is planned to expand the team of tutors and teachers from various educational organizations.

The Digital platform is ready to be used to train students around the world and to expand the range of training courses. The implementation of the project led to the achievement of qualitative and quantitative results, confirmed by the successful holding of an international event called “Open Education Forum in Russian for Foreign Citizens” (hereinafter referred to as the Forum) (Tab.).

Results of the project MPEI Digital educational platform for the implementation of open education courses for foreigners

Quantitative results	Qualitative results
<ul style="list-style-type: none"> • 1 developed and correctly functioning Digital Educational Platform; • 10 open education courses; • CONTENT: 135 theoretical presentations, 90 practical presentations, 695 test tasks, 12 glossaries, 10 educational layouts, 60+ videos, 6 developed programs and educational games; • 1 educational and practical international event based on the Digital Educational Platform, lasting 4 days. 	<ul style="list-style-type: none"> • promoting the platform, Russian education and the Russian language; • improving the quality of distance learning; • creating a positive information background to attract foreign citizens to study and work in Russia; • expanding the scope of application of the Russian language.

The main goal of the Forum was to inform about the creation and launch of the Digital educational platform, attract foreign users, tutors and teachers, as well as popularize the Russian language and Russian technical education in the BRICS, ASEAN, and CIS countries. The forum was held from November 28 to December 1, 2022 at the MPEI, Moscow, Russia.

At the forum, the development team conducted master classes on the capabilities of the Digital platform from the point of view of organizing training, the position of a teacher and tutor, as well as from the student's position. The event was attended by students, young professionals, entrepreneurs, teachers, school-children and administrative staff of universities and schools from 39 countries, including BRICS, ASEAN and CIS countries. In total, there were 1075 participants and more than 30 speakers including university leaders, scientists, academic staff and embassy representatives. The speakers shared best practices in creating and using distance learning resources, and also spoke about the features of teaching Russian as a foreign language and pedagogical skills.

The project, implemented by the MPEI with the support of the Ministry of Education of the Russian Federation, is aimed at creating, content filling, integrated administration, hardware and software, organizational and methodological support for the Digital educational platform.

The developed platform provides the possibility of remote learning in an interactive form free of charge with the right of independent choice by users of the pace, time and place of access to educational and test materials.

Taking into account the number of participants in the Open Education Forum and the feedback received, the project's working group suggests that the

platform can become a base for networking, cultural, humanitarian, scientific, educational and business cooperation with countries near and far abroad.

At this stage, the Digital platform is fully prepared to expand the range of training courses and be used by students around the world. This allows us to outline the main directions to work on in the future. These include improving the user's personal account with the ability to track the progress of their studies, providing limited access to the administrative panel in order to provide teachers from partner universities with the opportunity to post their training courses, filling out and translating technical glossaries into new languages, creating a single information platform for registering on educational, scientific and career guidance events organized by the MPEI (olympiads, conferences, master classes, etc.) and much more.

The results of the project were summed up at the All-Russian Seminar, organized on December 7, 2022 by Verkont Service LLC with the support of the Ministry of Education of the Russian Federation. By the decision of the expert commission, the MPEI project was selected for inclusion in the collection of the best practices of Russian education in the framework of international cooperation in the Russian Federation and abroad, including those aimed at ensuring the full functioning and development of the Russian language.

To support the Digital platform, it is planned to expand the team of tutors and teachers of the Digital educational platform including teachers of Russian and foreign educational organizations and to carry out constant interaction with partners from commercial companies interested in training their staff on a contractual basis using interactive distance education tools.

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