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UDK 629.114

Analysis of International Requirements for Rolling Stock

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Key words and phrases: vehicle; dimensions; international transportation; rolling stock; technical requirements.

Abstract. In the tough conditions of competition in the freight transportation market, road transport companies require effective management and informed decision-making. The right choice of vehicles makes it possible to achieve the successful development of international transportation. The article presents the design requirements for rolling stock for performing road freight transportation, the results of the analysis of international technical standards. The standards for the assessment of overall dimensions, the peculiarities of passing the car inspection procedure are considered, recommendations are offered to manufacturers to ensure the competitiveness of motor vehicles.

Vehicles used for international transportation must comply with international requirements. The Document on the Recognition of Uniform Approval Requirements and on Mutual Recognition of the Approval of Items of Equipment and Parts of Motor Vehicles, adopted in Geneva in 1958, and the Rules of the United Nations Economic Commission for Europe determine that each of the parties that have joined the document imposes the same rules for motor vehicles [1–12].

In total, about 100 UNECE Regulations have been adopted. Since Russia recognized the Agreement on Standardization of Vehicles in 1987, it is necessary to carry out certi-fication for approval of the type of rolling stock. Since 1997, Russia has become a member of the ECMT, and it has become possible to obtain reusable quotas and reduce the cost of vignettes (motorway fare) for cars that meet environmental conditions. Cars that meet the requirements of EVRO-1 and “Austrian Noise” are marked with the letter U (umwelt) on the green circle, and the requirements of EVRO-2, “Austrian Noise” and the additional conditions of the ECMT for equipment and road safety are marked with the letter S (supergrun). According to the UNECE Regulation No. 51, the level of external noise of a PBX with an engine power of more than 150 kW should not exceed 80 dB, and when compressed air is released from the pneumatic system of the car – no more than 72 dB (“Austrian noise”). Signs “3”, “4”, “5”, “6” are issued to “safe” trucks that comply with environmental standards, respectively, EVRO 3, 4, 5, 6.

In Russia, CJSC “TRANSDEKRA” carries out the procedure of conformity of rolling stock

for freight transport under multilateral permits of the European Conference of Ministers of Transport, and then issues certificates of suitability of motor vehicles and trailers (semi-trailers) for operation, and in addition confirming signs of compliance with technical safety standards and environmental requirements. Before passing the examination, it is necessary to provide a certificate of compliance with a specific category of motor vehicle issued by the manufacturer or its official representative in the country of registration. If the category matches, a special light green certificate is issued. To inspect a trailer (semi-trailer), the carrier must present a certificate of compliance with safety requirements issued by the manufacturer or its official representative in the country of registration. This certificate is issued on a special light yellow form.

Vehicles performing cargo transportation under the multilateral permits of the European Conference of Ministers of Transport must necessarily have on board a package of certificates confirming compliance with the requirements for the category (motor vehicles), safety conditions (trailers and semi-trailers) and suitability for operation.

The European Community Transport Commission has approved the following standards for the overall dimensions of rolling stock:

– the maximum height should not exceed 4 m;

– the maximum width should not exceed 2.55 m (2.6 m for refrigerated trucks and rolling stock with insulated bodies);

– the maximum length of a single motor vehicles should not exceed 12 m, for a trunk road train with a semi-trailer – 16.5 m, for a road train with a trailer – 18.75 m, with two trailers 25.9;

– the possible ground clearance should be at least 160 mm, and if the distance be-tween the axles of the trailer is more than 11.5 m – at least 190 mm;

– a road train with a semi-trailer with a total length of no more than 15.5 m should be able to make a U-turn inside concentric circles with a radius of 12.5 and 5.3 m (with the exception of a car carrier).

Directives on overall parameters, total weights and possible axial loads in some States may differ radically from the standards of the European Community. The EU restrictions do not ensure full harmonization, but only establish a possible norm that should be adopted by the country. Some States still apply their standards to improve the efficiency of the transportation process. The main requirements for cars when entering the EU states:

– compliance with environmental class EVRO-3 or more;

– availability of a digital tachograph;

– anti-lock system (**ALS**) on the axles of the tractor and trailer (semi-trailer-pa);

– overall and weight parameters in accordance with EU directives.

The development of new motor vehicles for international road transport is carried out taking into account the above requirements. In addition, in order to ensure the competitiveness of any products, including cars and their engines, when drawing up strategic plans, Russian manufacturers need to focus on the dynamics of technical and economic indicators of products of leading foreign firms, compliance with which will allow domestic goods to find their place in the market and compete on world markets.

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Анализ международных требований к подвижному составу

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Ключевые слова и фразы: автотранспортное средство; габариты; международные перевозки; подвижной состав; технические требования.

Аннотация. В жестких условиях конкуренции на рынке грузовых перевозок автотранспортные предприятия требуют эффективного менеджмента и принятия обоснованных решений. Правильный выбор автотранспортных средств позволяет добиться успешного

развития международных перевозок. В статье представлены конструктивные требования к подвижному составу для выполнения грузовых автомобильных перевозок, результаты анализа международных технических стандартов. Рассмотрены нормативы оценки габаритных размеров, особенности прохождения процедуры освидетельствования автомобилей, предложены рекомендации производителям для обеспечения конкурентоспособности автотранспортных средств.

UDK 004.04

Design and Development of Multifunctional Mobile Applications on the iOS Platform Using SWIFT 3

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Key words and phrases: Apple; Objective-C; Swift 3; Swift Framework; UIKit; Mask; mac OS; Mobile application; Integrated Development environment; Xcode.

Abstract. The purpose of the study is to discuss modern technologies and design and development tools that Apple provides to software developers for their own operating systems iOS, macOS, watchOS and tvOS. The objectives of the study are to analyze the feasibility of implementing the intended goal. The hypothesis of the study is to determine the need to develop multifunctional mobile applications. General scientific research methods are used in the paper. The analysis of the prospects for the introduction of a relatively new Swift programming language into their own projects is carried out, as well as the stages of creating their own iOS application for iPhone are demonstrated.

Introduction

Every year Apple holds the Worldwide Developers Conference (**WWDC**), presenting new technologies and the development of its own software. Apple mobile software developers gather there to discuss the modern technology market, which is developing at a high speed. If earlier, any company needed only a website to present its own products or services, now it needs to have its own mobile application in order to order a service in a few steps and immediately pay for it. Using mobile applications, it has become much easier to learn a foreign language, order a taxi, find the right place on the map. The mobile application allows you to analyze the actions of users, their reviews of the company's products and, based on this, offer contextual advertising, which in some cases significantly reduces the search time needed by the user. To date, the stack of technologies that Apple offers to developers is full-fledged and rich in functionality, with proper use of it, the advantages of mobile development over web development are growing considerably.

Review of publications on the research topic

The main source of information on this topic is technical articles by Apple representatives, owners of thematic resources dedicated to development for Apple operating systems, journalists who aim to convey to their readers the necessary information about current technology changes.

Having analyzed several web resources such as SwiftBook, Hacking with Swift, Medium, one can see that each resource offers its own approach to creating mobile applications, the use of certain technologies. For a beginner in the field of development, it is worth deciding on a programming language, a framework that will become the foundation of a future project, and the principle of user interaction with the application. Certain issues are disclosed rather superficially in narrowly focused articles, most of which are written for experienced programmers. Therefore, it is advisable to consider the topic of rapid entry into the field of mobile development, and emphasize the points that are worth paying attention to.

Materials and methods

The purpose of this research is to study the necessary technologies for developing your own mobile application, analyzing the prospects for using the Swift3 programming language, and presenting a number of application development stages with the final presentation of the iOS program “My Favorite Places”.

iOS is a proprietary mobile operating system from Apple. Developed initially for the iPhone, it was later improved also for the iPad, iPod Touch and Apple TV (until September 9, 2015, when tvOS was presented at a special Apple event). The iOS is a derivative of OS X, therefore, is by nature a Unix-like operating system. The iOS user interface is based on the concept of direct manipulation using Multi-Touch gestures. The control interface elements consist of sliders, switches and buttons. It is designed for direct user contact with the device screen [1].

The main tool for developing a program for iOS has become the Xcode integrated development environment with built-in visual interface capabilities, frameworks, and the main programming language in the system for developers has become Objective-C.

Xcode is an integrated development environment (IDE) produced by Apple. Allows you to create software using technologies such as GCC, GDB, Java, etc. Today it is the only means of writing “Universal” (Universal Binary) application programs for Mac OS X. The Xpode package contains a modified version of the free GNU Compiler Collection and supports C/C++, Objective-C, Swift, Java, AppleScript, Python and Ruby languages with various programming models, including (but not limited to) Cocoa, Carbon and Java [3].

The Swift compiler is built using the technologies of the free LLVM project. Swift inherits the best elements of the C and Objective-C languages, but at the same time differs in the use of automatic memory allocation and overflow control of variables and arrays, which significantly increases the reliability and security of the code.

At the same time, Swift programs are compiled into machine code, which allows for high performance. According to Apple, Swift code runs 1.3 times faster than Objective-C code. Instead of the Objective-C garbage collector, Swift uses object reference counting tools, as well as optimizations provided in LLVM, such as auto-vectorization.

Swift is tightly integrated into the Xpode development environment, however, it can be called from the terminal, which makes it possible to use it on operating systems other than macOS, for example, on Linux [3–6].

Results and discussion

One of the main innovations in Swift3 is playgraound, which looks like a simple editor window where you can write code. This code is compiled and executed immediately. No need to build a project and then run the emulator to see. Everything happens instantly: you write

code – you see the result. Classes are no longer divided into interface and implementation, halves the number of files in the project, in turn simplifies navigation through it, simplifying the syntax for creating fields and class properties. Properties no longer need instance variables, as previously in the latest versions of ObjC, these iVars were created automatically, but they could be prescribed manually. Now they cannot be created in principle, which means they no longer need to be taken into account.

Optional Types have appeared, they are used when the value of a variable may not exist for some reason. New functionality has been added for the switch operator, enumerations, generics has been implemented and the ARC (Automatic Reference Counting) memory management model has been significantly improved, which reduces the number of cases of RAM loss by the application [7].

Having considered all the available technologies, a specific small project (the My Favorite Places application) in the Swift3 programming language has been implemented.

The application is being developed using the Model – View – Controller template. The creation process provides two options for writing the interface, namely, placing interface elements using code, or using a storyboard (main.storyboard file), which is a so-called visual canvas that makes it possible to add controls to the screen by simply dragging from the library of objects.

Each object in the storyboard has its own class, which provides all the logic of the screen elements. In storyboard, by default, when creating a new project, there is already one screen, the so-called ViewController, which is launched at the start of the application, we use it to display a list of favorite places. For our purposes, the TableView control is ideal, which allows you to place content in the form of a list.

The ViewController.swif file implements the logic of reflecting our favorite places. This class inherits from the UIViewController class, which allows you to override and use the methods of the superclass. The first method that is available in the file is viewDidLoad(), which is activated immediately after loading the display screen, it is in this method that you should call all the necessary settings and initialization of variables. To display any elements in the TableView, it is worth signing the ViewController class to the delegate and data owner protocol, namely UITableViewDelegate and uitableviewdatasour ‘e, which require the implementation of two mandatory methods cellForRow (returns a row with a cell that is used by the TableView object in the future) and numberOfRowInSection (returns the number of rows in the section, by default it is 0), and also for tableView you need to assign a delegate class and a data provider class using a tableView fragment. delegate = self and tableView.datasource = self. Therefore, after implementing these methods, it is already possible to run the simulator and see the result in the form of several empty lines.

It is according to this algorithm that the initial creation of most applications takes place. Swift provides powerful capabilities for customizing custom objects, a large number of available already implemented objects ready for use in their projects. By implementing several methods and dragging several objects, it is already possible to see the finished result of your work. Since the finished project in this article provides several pages of code. Figure 1 shows the StoryBoard of the finished project.

Conclusions

The relevance of using mobile applications is very high and the number of developers is growing every year, companies are trying to use new technologies for designing and developing mobile applications in order to attract as large an audience as possible to their own platforms.

Countries are trying to meet the level of demand for mobile development by teaching students various technologies, as a large number of companies are now ready to pay high salaries to highly qualified programmers who develop the technological level of the country and the company as a whole with their own knowledge and creativity. In the future, it is planned to master new technologies of server programming in Swift and development using React Native, which is used for fast programming for all popular platforms, both iOS and Android.

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Проектирование и разработка многофункциональных мобильных приложений на платформе iOS с использованием Swift 3

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Ключевые слова и фразы: Apple; MacBook; macOS; Objective-C; Swift 3; Swift Framework; UIKit; Xcode; интегрированная среда разработки; мобильное приложение.

Аннотация. В статье рассмотрены современные технологии и инструменты проектирования и разработки, которые компания Apple предоставляет разработчикам программного обеспечения для собственных операционных систем iOS, macOS, watchOS и tvOS. Задачи исследования – проанализировать целесообразность реализации намеченной цели. Гипотеза исследования: разработка многофункциональных мобильных приложений является перспективным направлением. В работе использованы общенаучные методы исследования. Проведен анализ перспектив внедрения в собственные проекты относительно нового языка программирования Swift, а также продемонстрированы этапы создания собственного iOS приложения для iPhone.

UDK 004.9

Electromagnetic Compatibility Problem in Modern Electric Energy Meters

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Key words and phrases: electromagnetic compatibility; electricity meters; measurement error; electromagnetic interference.

Abstract. The object of this study is a static electricity meter. The aim of the study is to improve the accuracy of the readings of electricity meters. The research task is to realize the research goal. Research hypothesis: to assess the accuracy, the author raises the question of electromagnetic compatibility in static meters of electrical energy, due to the instability of the main electrical parameters in electronic devices. The work used general scientific research methods. The result was obtained: to eliminate electromagnetic interference, it is proposed to use an interference suppression filter.

In the trend of current scientific and technological progress, electromagnetic compatibility (**EMC**) is of increasing importance. The EMC is the ability of an equipment or system to function satisfactorily in a given electromagnetic environment without creating unacceptable electromagnetic interference to other equipment or other systems in this environment [1; 2]. The slightest negative electromagnetic effect, at best, leads to errors in the operation of the technical system (**TS**), and of-ten to physical malfunctions [3].

In the last decade, the dimensions of electronic components have been de-creasing, and at the same time the level of influence of such elements on each other is growing. Significant electromagnetic interference is caused by power devices and distributed generation of energy from various sources, which have shifted the power industry towards higher frequencies [4]. Current waveforms caused by AC and non-linear loads can have frequency disturbances up to 150 kHz and above. New EMC requirements for technical systems have been developed and methods for evaluating EMC have been standardized. However, in the recent past, energy readings of some static electricity meters have shown that they are sensitive to certain interferences, showing read errors of up to several hundred percent. An independent study using traceable metering equipment, carried out on a more extensive set of static meters, confirmed these earlier findings [5]. Such loads were LED and fluorescent lamps with dimmers, which caused intermittent and peak current fluctuations with a significant frequency in the range from 100 Hz to 30–50 kHz.

To eliminate the above-described type of interference, it is proposed to use noise suppression filters, which are elements to ensure the attenuation of the flowing noise. Their use presupposes

that the frequency characteristics of the useful signal and interference differ significantly from each other. This allows for selective damping of oscillations with weak distortion of the useful signal. In this case, the effect of damping is directly provided by dividing the voltage [6].

If a high-frequency noise voltage is supplied to the low-frequency circuit of the useful signal, then a component of the interference voltage appears at the impedance of the receiver:

$$\underline{U}_{ST} = \underline{U}_0 \frac{\underline{Z}_S}{\underline{Z}_Q + \underline{Z}_S}.$$

The introduction of a frequency-dependent longitudinal impedance, for ex-ample, in the form, implies a very small resistance for a low frequency current, and a very large resistance for a high frequency current, provides interference attenuation, and the interference voltage is reduced to:

$$\underline{U}'_{ST} = \underline{U}_0 \frac{\underline{Z}_S}{\underline{Z}_Q + \underline{Z}_L + \underline{Z}_S}.$$

The damping effect can be characterized by the damping coefficient – the ratio of voltage drops on, with and without it:

$$\left|\frac{\underline{U}_{ST}}{\underline{U}'_{ST}}\right| = \left|\frac{\underline{Z}_Q + \underline{Z}_L + \underline{Z}_S}{\underline{Z}_Q + \underline{Z}_S}\right|.$$

The damping factor is usually given as a logarithm of the voltage ratio and is expressed in decibels:

$$\alpha_e = 20\lg\left|\frac{\underline{U}_{ST}}{\underline{U}'_{ST}}\right|.$$

In principle, line filters consist of various transverse capacitors and longitudinal inductances (low-pass filters) [7]. Taking into account the relatively high operating voltages and currents, as well as proceeding from the aspects of the reliability of the devices, special structural elements were created for the construction of network filters, which are considered in the work of K.A. Bochkov [8; 9].

Using noise suppression filters in modern static electricity meters, you can achieve high accuracy in readings and extend their service life. This technology is beneficial from an economic point of view.

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Проблема электромагнитной совместимости в современных счетчиках электрической энергии

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Ключевые слова и фразы: погрешность измерения; счетчики электрической энергии; электромагнитная совместимость; электромагнитные помехи.

Аннотация. Объектом данного исследования является статический счетчик электроэнергии. Целью исследования является улучшение точности показаний счетчиков электроэнергии. Задача исследования – реализовать цель исследования. Гипотеза исследования: для оценки точности автор ставит вопрос об электромагнитной совместимости в статических счетчиках электрической энергии, обусловленных нестабильностью основных электрических параметров в электронных приборах. В работе использованы общенаучные методы исследования. Получен результат: для устранения электромагнитных помех предлагается использование помехоподавляющего фильтра.

UDK 69

Application of Horizontal Directional Drilling Technology in the Laying of Underground Utilities

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Key words and phrases: horizontal directional drilling; engineering communications; destabilizing factors; organizational and technological solutions.

Abstract. In the context of the development of a market economy and the growth of scientific and technological progress, the use of horizontal directional drilling (**HDD**) technology to obtain high-quality products in the course of the activities of construction organizations is becoming a factor in increasing competitiveness. The purpose of the study is to identify diverse factors that arise during the implementation of the technology under study. To achieve this goal, the following tasks were formulated: to determine the factors influencing the successful application of HDD technology, as well as to develop solutions to eliminate the effects of destabilizing factors. The article presents a study of the use of HDD technology in the construction industry on the example of the implemented project, recommendations (organizational and technological solutions) are given to optimize and minimize the influence of destabilizing factors in the production of engineering and construction works. The results of the study can be used by all participants in the construction industry during the pre-contract study of an investment project or already during the laying or replacement of engineering communications using HDD technology.

The study of the use of HDD technology in the construction industry plays a significant role in the formation of competitive advantages associated with the availability and effective use of available information resources and the qualitative achievement of set goals, including the timely commissioning of various facilities.

At a recent meeting, Deputy Prime Minister of the Russian Federation Marat Shakirzyanovich Khusnullin said that the Government of the Russian Federation is preparing a concept for restructuring the housing and communal services sector, since it is impossible to increase the volume of housing and the quality of the urban environment in a planned manner without it. Among the issues that need to be addressed, he referred to dilapidated housing, worn-out infrastructure and incomplete collection of utility bills [1].

Marat Shakirzyanovich also stressed that it is worth solving the issue of heating networks and water pipes worn out by 60 %, since the program of their modernization has not yet been radically confirmed by money. The Deputy Prime Minister noted that over 1 trillion rubles are required to upgrade the infrastructure [1].

In this context, the use of HDD technology is very relevant, given the real wear and tear of engineering communications throughout the country, and especially in such a multi-million megalopolis as Moscow.

The creation of HDD technology can be attributed to the end of the 15th century, when Leonardo da Vinci invented a device for drilling a well in the ground at any angle, even horizontally. The 10 drilling rigs he created formed the basis for the construction of first a manual, and then a fully automatic installation for the first time.

Due to the insufficient development of the mass industrial base for a long period of time, this method remained undervalued. And yet, throughout the subsequent history, HDD technology has been continuously improved. During the laying of the pipeline in California (USA) in 1971, a breakthrough occurred. The author of the project was tasked with drilling a well under the Pajero River.

This work was excellently handled by the American industrialist and inventor Martin Cherrington, who is now rightfully considered as the “father” of HDD technology [2].

Successfully completed works, as well as the need for measures to improve the infrastructure of settlements, brought this technology to the peak of popularity. HDD technology was used for laying engineering communications for various purposes (gas, water, electric, telephone cables), which was carried out without digging trenches and did not require subsequent restoration work.

No less interesting is the use of this technology by domestic builders. The Ministry of Defense of the country has implemented many landmark construction projects, not only from the point of view of social significance, but also from the point of view of the scale and record deadlines for the implementation of projects.

Among the iconic objects, it is particularly worth noting the water intake built in the valley of the Belbek River in a record 115 days, the official opening of which took place on behalf of the President of the Russian Federation on March 18, 2021, before the floods and the holiday season [3].

Taking into account the complex landscape of the Republic of Crimea, a trunk pipeline with a length of more than 10 kilometers was laid using HDD technology. A unique Russian-made water pumping station has been built.

The structure of this hydrotechnical complex includes an administrative and household territory, a complex of treatment facilities, a storage tank with a capacity of 150,000 cubic meters, a storage pool, a dam, a hose for water delivery, three pumping stations and four bowls for clean water [3].

The HDD technology has once again justified itself, allowing to significantly reduce the time and cost of project implementation, and therefore it remains very relevant and in demand in the modern world of technological progress.

Using the example of a successfully completed project, it can be seen that the rehabilitation of engineering communications using HDD technology allows us to solve the following problems:

- to reduce the costs of the preparatory period of the device of engineering communications;
- to restore communications that have failed, as well as to equip underground highways in hard-to-reach places;
- reduce the labor intensity and time of work;
- reduce the cost of returning the landscape to its original state;

Table 1. Factors contributing to the spread and implementation of HDD technology

Factors	Results
Natural and climatic conditions	Allows construction in geologically complex regions (mountainous areas of Transcaucasia and the North Caucasus, the Republic of Crimea, the Far North, the Arctic and many others)
The presence of an extensive network of underground utilities	HDD technology is necessary not only for the development of new territories, but also for the repair and replacement of engineering communications during the production of repair and construction works in the housing and communal sphere
Preservation of existing road surfaces and landscaping	There are no additional costs associated with the restoration of the disturbed surface layer, and the existing ground infrastructure is fully preserved
Development of new territories	Laying of underground communications under the riverbed and reservoirs, implementation of bold projects, development of new territories and improvement of the communications network
Preservation of the mode of life	Performing works under busy road arteries without stopping traffic (MKAD, TSKAD, FAD, etc.)

- to ensure the required quality of the construction process and obtain reliable data for the feasibility study of the project.

When using the HDD technology, previously laid communications, existing ground infrastructure, finishing coatings of roads and railways are preserved [4]. At the same time, expenses for employees of working specialties are reduced. To perform the work, it is enough to attract a small team with highly qualified specialists.

Minimizing the energy costs of drilling equipment is achieved due to the mobility and autonomy of the equipment.

Destabilizing factors arising during the production of works:

- insufficient level of qualification of personnel, violation of safety regulations, negligence and lack of professionalism of operators of HDD installations are the causes of human casualties and destruction of houses in accidents;
- lack of service, technical support and extended delivery times of consumables lead to an increase in the timing of construction projects and the cost of ownership of mechanisms;
- the absence of domestic analogues of technological equipment and storage facilities for the storage of spare parts in order to eliminate problems in a timely manner;
- absence of approved regulations for the disposal of spent bentonite drilling mud (sludge).

Solutions to eliminate the effects of destabilizing factors

In the course of this study of HDD technology, the following technological and organizational solutions were identified, which differ depending on the stage of work.

Measures to be taken at the preparatory period:

- high-quality collection of initial data and competent use of archival materials on engineering and geological surveys, taking into account local peculiarities;
- ensuring proper quality control of the materials used;
- the use of progressive innovative tools and their interchangeability;
- timely adjustment of production load.

Measures to be taken during the main period:

- strict application of professional standards and training of their personnel;
- compliance with the requirements of safety regulations;
- personal responsibility of operators for the quality of HDD performance.

Measures to be taken throughout the final period:

- development of a recycling algorithm and creation of a regulatory framework for the classification of waste spent drilling mud;
- increase of dealerships and service stations for the purpose of timely troubleshooting.

Despite the identified factors that create difficulties in the implementation of projects, HDD technology can definitely be called advanced, very necessary and timely [5]. Since the leading manufacturers of drilling rigs are engaged in solving the main issues related to the training of high-quality personnel and increasing production capacities in Russia, it seems that in the near future there will be fewer significant shortcomings.

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Применение технологии горизонтального направленного бурения при прокладке подземных инженерных коммуникаций

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Ключевые слова и фразы: горизонтальное направленное бурение; дестабилизирующие факторы; инженерные коммуникации; организационно-технологические решения.

Аннотация. В условиях развития рыночной экономики и роста темпов научно-технического прогресса применение технологии горизонтального направленного бурения (**ГНБ**) для получения качественной продукции в ходе деятельности строительных организаций становится фактором повышения конкурентоспособности.

Цель исследования – выявление разнохарактерных факторов, возникающих при реализации исследуемой технологии. Для достижения поставленной цели были сформулированы следующие задачи: определить факторы, влияющие на успешное применение

технологии ГНБ, а также разработать решения для устранения воздействия дестабилизирующих факторов.

В статье представлено исследование применения технологии ГНБ в строительной отрасли на примере реализованного проекта, даны рекомендации (организационно-технологические решения) по оптимизации и минимизации влияния дестабилизирующих факторов при производстве инженерно-строительных работ.

Результаты исследования могут быть использованы всеми участниками строительного производства при предконтрактной проработке инвестиционного проекта или уже в ходе прокладки или замены инженерных коммуникаций с применением технологии ГНБ.

UDK 338

Macroeconomic Policy in the Field of Social Protection of the Population by the State in Modern Russia

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Key words and phrases: state measures of social protection; social protection of the population; social categories of the population.

Abstract. In order to study the macroeconomic policy of the state in the field of social protection of the population, the article provides an analysis of various types of assistance and support measures currently used. It is noted that some categories of citizens can use several types of social protection measures at once. Methods of economic analysis, statistics, and comparison were used. As a result of the conducted research, an enlarged classification of state social protection measures is given, their monetary expression is given.

In order to protect certain social categories of the population, the state uses different types of assistance and support measures. Some categories can use several types of social protection measures at once. For example, federal beneficiaries receive a package of social services, as well as monetary assistance and material support.

Collectively, all state social protection measures can be reduced to the following categories:

- social pensions (for the disabled, for the loss of a breadwinner, for old age without insurance experience);
- benefits for certain categories of citizens (for disabled people, large families, minors);
- social services and the provision of social services (services at home and in special institutions for the disabled, disabled);
- social benefits (for the unemployed, temporary disability, child care, for orphans, etc.);
- lump-sum payments (maternity capital, payment to the unemployed for starting a business, payments at birth/adoption, etc.);
- provision of real estate and benefits for acquisition (for orphans, young families, young teachers, doctors);
- other social protection measures.

Thus, the state offers different types of assistance to citizens and families who are not socially protected or in need of assistance.

Where to apply for registration of benefits and allowances.

Each type of social protection measures involves its own registration procedure. You can

Table 1. Minimum wage from 2014 to 2021

Indexation date	Amount, RUR
01.01.2021	12,792
01.01.2020	12,130
01.01.2019	11,280
01.05.2018	11,163
01.01.2018	9,489
01.01.2017	7,500
01.01.2016	5,204
01.01.2015	5,965
01.01.2014	5,554

Table 2. The amount of BiR allowances, taking into account indexation in 2021

Financial allowance	Amount, RUR (01.02.2021)
Early pregnancy registration allowance	708.23
Pregnancy-maternity allowance to women due to liquidation of organization	708.12
One-time allowance on child birth	18,886.32
Minimal monthly childcare allowance up to 1.5 y.o.	7,082.85
Childcare allowance in the Chernobyl zone 1) up to 1.5 y.o. 2) from 1.5 to 3 y.o.	 3,652.44 7,304.87
Burial expenses reimpursement	6,424.98

Table 3. The amount of one-time and monthly allowance for the child of a conscript soldier in 2021

Date	Indexation	One-time allowance, RUR	Monthly allowance, RUR
01.02.2021	4.9 %	29,908.46	12,817.91
01.02.2020	3 %	28,511.4	12,219.17
01.02.2019	4.3 %	27,680.97	11,863.27
01.02.2018	2.5 %	26,539.76	11,374.18
01.02.2017	5.4 %	25,892.45	11,096.76
01.02.2016	7 %	24,565.89	10,528.24
01.02.2015	5.5 %	22,958.78	9,839.48
01.02.2014	5 %	21,761.88	9,326.52

Table 4. The amount of monthly survivor's allowance in 2020

Date	Indexation	Allowance, RUR
01.02.2021	4.9 %	2,578.02
01.02.2020	3 %	2,457.60
01.02.2019	4.3 %	2,386.02
01.02.2018	2.5 %	2,287.65
01.02.2017	5.4 %	2,231.85
01.02.2016	7 %	2,117.50
01.01.2015	5.5 %	1,978.97
01.01.2014	5 %	1,875.80

Table 5. The amount of social pension from 01.04.2021

Type of pension	Payable to	Amount, RUR
Old-age pension	Indigenous people of the North aged 55 and 50 (men and women, respectively)	5,796.76
	Citizens aged 70 and 65 (men and women, respectively)	
Disability pension	Disabled children	13,912.10
	Disabled children of 1st group	13,912.10
	Disabled children of 2nd group	11,593.58
	Disabled adults of 1st group	11,593.58
	Disabled adults of 2nd group	5,796.76
	Disabled adults of 3rd group	4,927.29
Pension for loss of breadwinner	Loss of one parent	5,796.76
	Loss of both parents	11,593.58
	Unknown parents	
	Dead single mother's children	

find out which documents you need to provide when contacting the appropriate government agency.

Various types of social protection of the population are being issued in such institutions.

- Pension Fund of the Russian Federation: social pensions, maternity capital, disability pensions, monthly cash payments, federal social supplement.
- Social Insurance Fund: payment of benefits for pregnancy, childbirth, child care, provision of disabled people with prostheses, provision of preferential categories with vouchers to sanatoriums.
- Employment center: payment of unemployment benefits, one-time payments for the organization of their business.
- Local Department of Social Protection): benefits to various categories of the population at

Table 6. Monthly payments to disabled people in 2021

Monthly payments, RUR	Disabled child	Disabled children		
		1st group	2nd group	3rd group
Monthly payment	1,707.36	2,875.69	1,707.36	1,125.04
Monthly payment + social welfare	2,919.00	4,087.33	2,919.00	2,336.68
social welfare:				
Full set (maximum)	1,211.64			
Treatment and medicine	933.25			
Health resort treatment	144.36			
Free local rail pass and health resort transfer	134.02			
Care payment	10,000 – to parents and guardians 1,200 – to other persons		Not paid	

Table 7. The size of the fixed pension payment and the cost of 1 pension coefficient for the years 2019–2024

Year	Fixed payment, RUR	One pension point	Indexation %
2019	5,334.19	87.24	7.06 %
2020	5,686.25	93.00	6.60 %
2021	6,044.48	98.86	6.30 %
2022	6,401.10	104.69	5.90 %
2023	6,759.56	110.55	5.60 %
2024	7,131.34	116.63	5.50 %

Table 8. Monthly child tax deduction in 2021

Tax-allowed deductions	Parents	Guardian
1st child	1,400	1,400
2nd child	1,400	1,400
3rd third and subsequent children	3,000	3,000
Disabled child	12,000	6,000
Tax deduction limit	350,000	

the local level, assistance to the poor, large families, labor veterans, and many other categories.

- Medical and preventive institutions: medical examination.

The materials presented in the tables illustrate that the Legislation of the Russian Federation provides for various types of social assistance and support from the state can receive the widest range of those in need.

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Макроэкономическая политика государства в области социальной защиты населения в современной России

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Ключевые слова и фразы: государственные меры социальной защиты; социальная защита населения; социальные категории населения.

Аннотация. С целью изучения макроэкономической политики государства в области социальной защиты населения в статье приводится анализ разных видов мер помощи и поддержки, используемых в настоящее время. Отмечается что некоторые категории граждан могут пользоваться сразу несколькими видами мер социальной защиты. Использованы методы экономического анализа, статистики, сравнения. В результате проведенного исследования приводится укрупненная классификация государственных мер социальной защиты, приведено их денежное выражение.

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