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PRECAUTIONS OF THE DRUG ADDICTION AMONG STUDENTS OF SECONDARY SCHOOLS (THE EXAMPLE OF KRASNODAR REGION)

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Basing on survey of students the statements of precautions of drug addiction are given in the article.

Keywords: precautions, drug addiction, students, monitoring, drug abuse situation

The main subject of study is the organization of monitoring of drug abuse situation in Krasnodar region among minors. Purpose of study supposes supervision, fixation and analyses of primary parameters of use and illegal drug trafficking to discover their coincidence to expecting results of fight with drug crimes in definite spatio-temporal borders. Realization of continuing (5 and 10 during summer time), principal (once the year) and current (once the quarter) drug abuse monitoring is considered optimal. Project assumes discovering the impartial situation of trafficking of drug addiction among minors in Krasnodar region, comparison main empiric characteristics of non-medical drug use in the community of youth, influence of non-medical drug use among minors on queer and delinquent behaviour of minors, forming of structure and dynamics of drug crimes committed by minors.

There are results of survey of 1073 pupils from eighth to eleventh forms of comprehensive schools situated in Krasnodar region in age from 12 to 18 years old. And the results can show an inclination (presence of experience) to drug addiction, but not a real or constant use. They don't reflect a real level of drug addiction, because facts of occasional or even regular drug use are rather latent and are hidden from close people, family members by respondents, as non-medical drug use is blamed by society and it is dealt with different forms of administrative and criminal prosecuting. Besides student don't think that some ways of using "light" drugs (e.g.: smocking of anasha) are real drug use. That's why a real lever of drug use by youth is higher than discovered one. Thus we can see the fall of age border of minors, who is inclined to drug use. The survey has shown that single (also accidental) drug use doesn't lead to firm drug addiction.

These studies let us to make a conclusion, if a teenager didn't have the experience of drug use from 14 to 16, probability coefficient of drug use would be too little for him and it would be near 0,1. Therefore it's necessary to protect minors under 18, differentially addressing the main measures taken for the total prevention of drug addiction.

Second monitoring of drug abuse situation among pupils, where the age of drug users was defined, showed that lowering of age border of minors inclined to drug use still saved. The acquaintance with drugs has an accidental character and it's restricted to one or several episodes for the majority of addicted in every age group, and speed of lowering drug use is rather higher than narrowing of circle its casual users with increasing the age of those who are under consideration. Also there is a very important fact that for every second who tried drugs Cannabinoid are easy to take, for every sixth – opiates. Thus personal key factor of drug addiction among youth is the interest to unusual and bitter senses, which are aroused by drug use, and the main social reasons of this are friends, street companies, where drug use has become usual group norm. Differentiated act of these and other discovered psychological and social factors defines social mechanism of determination of drug use among minors. Common coefficient of pupils' law knowledge was 0,65 (100% = 1).

In the study of drug addiction as the main part of primary model of drug abuse situation's monitoring the initial purpose was to discover a real level of drug addiction among pupils more liable to drug risk.

Among the anti-criminal factors of drug addiction spreading an important role belongs to awareness and widespread effects of drug abuse. The poll showed that majority of juveniles knows about the danger of drug use. Students have also quite distinct ideas about specific consequences of drug use. Thus, active prophylactic drug stance in an informal environment of the pupils is dominant, that should be taken into account in the organization of drug abuse prevention.

According to the results of monitoring the drug situation in the Krasnodar region among schoolchildren had reached the following conclusions:

1. Conducting of regular monitoring studies of anesthesia is necessary for the establishment of a system of accumulation of subjective statistics about changes of the volume, the level structure of the anesthesia, the effectiveness of social control in the conditions of rapid social change. However, the identified level of drug abuse needs to be adjusted to a higher intensity of drug use in drug risk groups (approximately in 2 times) and manifestations of natural (unconscious) and artificial (conscious) latency of drug use in the school environment and minors in general.

2. Age drug users' settings identified during the study allow to highlight the three main levels of early drug use among school students:

- to 10–12 years (18.5% of consumers);

- 12-16 years (71.4%);

-16-18 years (10.1%).

Similar options should contain and the preventive resistance model of drug abuse.

3. Structure of the narcotic drug use determinat includes the following groups of factors: personal, microstructural, social. In the first group dominant factors are "interest to unusual and poignant sensations", "an opportunity to get away from the problems of reality, forget", "loneliness and boredom", "pleasure, euphoria, which cannot be obtained by other means", "levity". The second group is dominated by the influence of friends, street environment, "family conflicts and misunderstandings", "and idleness and poor organization of leisure activities".

4. Monitoring studies reveal statistical association smoking with anesthesia of teenage environment, as the abuse of tobacco is often a background of behavioral practices and promotes experimentations with drugs. Ban on tobacco and alcohol advertising seems complete justifiable. It seems righteous to conduct regular information campaigns in the media, forming aims on a healthy lifestyle. Actively counter the spread of drug use, as well as tobacco, alcoholic beverages should be drug prevention materials.

5. Structural differentiation of drug use is characterized by the following features:

a) cannabinoids (cannabis drugs) are the most extended and used as a "light" drug type among minors;

b) the consumption of "hard" drugs of opium type in the region is relatively small and has a certain distribution of the decline;

c) reduction in opiate use is replaced by the growth of cannabinoids, psychoactive substitutes (compositions based on glue "Moment", acetone mixtures, smoking blends, etc.).

6. Social values and guidelines, the implementation of which could significantly reduce the level and extent of drug addiction among school students are constructive leisure, sports, education, employment, career prospects and a decent standard of living. 7. The problem of teenage drug use is not effectively regulated by measures of criminal and administrative law. Drug users compared with drug non-users have uncultivated sense of justice (for most of them the purchase of drugs is not an offense, much less a crime).

8. Drug users – a group of increased risk of victimization: violent crimes are often committed against them, and they are really need of legal protection, psychological and medical assistance.

9. Anesthesia of adolescents contributes to their personal immaturity, which does not allow them to fully feel the psychological support and protection of the family and relatives, to feel self-esteem, to self-overcome the problems and to find constructive solutions and to achieve success in life.

10. Strengthening of value orientations and aims currently happening among teenagers, awareness of the danger of periodic drug tasting, attitude to drug experience, and to those who gets it, becomes more and more negative. This communicative result definitely reduces the massive demand for drugs, the probability of drug debuts and re-using drugs. However, active steps to disseminate the special antidrug literature, leaflets, participation in the work of hotlines, the provision of social and psychological assistance to drug addicts still shows a very small number of adolescents and young adults.

In order to streamline drug prevention measures is proposed:

1. To conduct an interagency meeting with the Commissioner for Human Rights on the issue of drug abuse, with particular emphasis on the measures taken to combat youth drug addiction.

2. To create with the administration of the region, Regional Interagency Research Center to monitor the drug situation, including the continuous holding of representative sample surveys (lasting -5 and 10 year periods, the main – once a year, the current – once per quarter) for the purpose of comparison latent array production, marketing and consumption of narcotic and potent substances.

To ensure its educational and methodical, normative and technical equipment, including training and staff development center.

3. To implement a long-term preventive programs for the prevention of drug use (within the governor's program "Antinarko") including:

- information and education, health improvement and rehabilitation work, the provision of socio-psychological and medical assistance to drug addicts;

- prevention of drug abuse within family structures, communities of former drug

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Medical sciences

quences of drug use. 4. It should be taken into account in the development of drug prevention programs:

- age range of drug use (including its early forms);

- the general structure and hierarchy of factors of anesthesia population;

- profound defects of legal consciousness of groups of drug risk and stable position of indifference part of the population regarding the problem of addiction;

– low social significance of official entities of drug prevention (such as a school, psychological and psychotherapeutic services, organs of internal affairs units for the prevention of juvenile delinquency).

5. To create a system of valuation of scale of the drug threat in the districts in the complex

providing measures of the social, economic, educational, legal, organizational and information-analytical character.

6. To develop a regional programs to reduce drug demand and supply reduction measures on them, which should be a key factor in combating with drug aggression. Implementation of programs should start with the definition of the boundaries and parameters of the drug market, taking into account the specific socio-economic conditions and regional particularities. The program should include fundamental research on the social, economic and political consequences of the drug menace in the region and the country.

7. Using the experience of other countries to establish the Institute helping the family (the center of interagency cooperation in combating with child abuse), which should consist service care, doctors, child psychologists to prevent protracted situations of domestic violence, suicide of minors, drug use, and others.

Biological sciences

SKIN ACOUSTIC SCANNING

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In recent years the *acoustic method* is widely used for diagnostics and observation of the skin treatment (soft tissues) which is based on the measurement of the propagation speed of an audible frequency surface waves in tissues. This method is widely used in various branches of medicine. This work represents investigation results of different tissue systems (rats' skin, different scars on human skin, rabbits' eyes sclera) mechanical properties, obtained by noninvasive acoustic express-method, which is based on the measurementof the propagation speed of audible frequency surface waves. The morphological method was applied to these systems in parallel with the acoustic method. The correspondence between mechanical properties of tissue systems and structural organization of the examined tissues was found. It was shown the possibility of partial replacement of the diagnostic biopsies for acoustic imaging.

Keywords: acoustic method, speed of propagation of audible frequency surface waves, morphological method, connection between mechanical properties and tissue structure

Nowadays the following various noninvasive visualization technologies for skin studies [9], are being used: optical video monitoring, optical tonometry, 3D-modelling, tevametry, (vapometry), corneometry, superficial pH-metry, reviscometry, ballistometry, dermatoscopy; optical coherent skin tomography; confocal laser imaging in vivo microscopy; ultrasound skin imaging (syn.- dermatosonography).

In the diagnostics and assessment of treatment effectiveness, the above methods are quite informative, but expensive. They require the particular training of specialists to work with the corresponding stationary devices.

In recent years the *acoustic method* [10, 5] is widely used for diagnostics and observation of the skin treatment (soft tissues) which is based on the measurement of the propagation speed of an audible frequency surface waves in tissues. This method is widely used in various branches of medicine [6,7,8].

Purpose of the work: to show the possibilities of the acoustic method use for differential objective diagnostics of the tissues condition by comparison of the obtained results with the morphological studies of these tissues.

Materials and methods of research

Acoustic method

Study of tissue mechanical properties was performed by using two instruments, peculiar for their practical characteristics of wave disturbance generation: acoustic tissue analyzer (ATA) [10] and acoustic medical diagnostic instrument (AMDI) [5], which determine the propagation speed of surface wave V.

The following parameters were calculated from the measured values of the velocity:

• $\Delta V = V_s - V_n$ - speed difference in pathological and normal tissues (or speed difference, measured during different periods of treatment);

• $Z = V_s/V_n - ratio$ of speeds in pathological and normal tissues;

• V_y , V_x – speeds in the mutually perpendicular directions which are used in mechanical anisotropy examination;

• Acoustic anisotropy coefficient $K = V_y/V_x - 1$. Morphological method

Tissue samples were analyzed as per standard morphological method: preserved in 4% neutral formaldehyde solution with acetate buffer (pH = 7,2-7,4). After 24 hours rinsing the tissue samples are dehydrated in ascending concentration alcohols and poured in paraffin as per regular procedure. The prepared sections are coloured with haematoxylin and eosin to verify the general morphological picture and by Van Gieson method as per standard histological method. The coloured preparations are examined with the help of the microscope Nu (Karl Zeiss, Germany) under diffuse light.

Test object

To show the acoustic method possibilities, this project represents previously made investigations on different biological systems: rats' skin after hydrocarbon gel subcutaneous introduction, human skin with scar changes; rabbits' eyes sclera after collagenous plastic procedure.

Results of research and their discussion

1) Polyacrylamide hydrocarbon gel "Argiform"

Polyacrylamide gels are used for soft tissues endoprosthesis replacement.

The project [1] represents the possibility of acoustic in vivo method use for objective evaluation of rats' skin properties after hydrocarbon gels introduction. The gel is subcutaneously injected in a particular place on the thigh. Acoustic measurements are made in two directions: the first one (V) corresponds to the natural vertical orientation of the animal's leg; the second one (Xaxis) – is perpendicular to the first one.

The gel is injected subcutaneously with a syringe, the needle of which is directed along the V axis. The wave rate was measured in the central spot over the gel introduction zone.

Speed change dynamics ΔV_y and ΔV_x is represented in Table 1.

									Т	able 1
Time after inje	ction		30	min	1 day		14 days		30 days	
Wave changes rate along X and Y axes $(\Delta V, m/c)$			ΔV_y	$\Delta V_{\rm X}$	ΔV_y	$\Delta V_{\rm X}$	ΔV_y	$\Delta V_{\rm X}$	ΔV_y	$\Delta V_{\rm X}$
			17	3	17	23	30	27	35	28
Anisotropy Before After 30 min After 14 days Aft								Table 2 fter 30 days		
Absent	20%		10%		10% 0%			6%		
"positive" $(V_y > V_y)$	60%	27%				82%			89%	
"negative" $(V_y < V_x)$	20%	63 %		63% 18%				5%		

 ΔV parameter was changing in different periods after the gel introduction. The parameter stabilization is observed within 14–30 days. By this time the speed values are finally stabilized.

Gels introduction causes the redistribution of the mechanical tension in the skin. Table 2 represents the anisotropy development before and along different periods after the gel introduction.

While the subcutaneous gel introduction one can observe the "positive" anisotropy predominance which is basically the reflection of tensile stress towards the natural orientation of the animal's leg (Y axis).

The acoustic characteristics were correlated with the morphological results of the biopsy samples taken directly from those areas where the speed was measured. Fig. 1 represents the results obtained after 30 days after hydrocarbon gel introduction (increase \times 32).

According to the obtained histological data by 30 days after hydrocarbon gel introduction the maturation processes and connective tissue remodeling are completed. Till this very moment the capsule formation period is stabilized and density of its borders is increased. Orientation of the capsule under formation corresponds to the acoustic skin anisotropy at the place of hydrocarbon gel introduction – the capsule is oriented towards the most prominent acoustic anisotropy evidence.

As the biomechanical properties of the connective tissues structure are determined by the architecture of the dense collagenous fibers bundles, this is the fact which determines the speed increase. Another thing influencing the speed increase is the density of the capsule filled with the gel. Speed values stabilization in the area over the capsule (by 30 days) witnesses the completion of the principal structural changes in this area.

The same results are obtained for another 3 hydrocarbon gels [1].

In such a way it is shown that the dynamics of the tissue acoustic characteristics changes corre-

sponds to the dynamics of its structural organization formation in the area of the gel introduction

2) Combined scars

Non-invasive determination of a skin scar injuries type is topical. It is caused by the necessity of some adequate treatment selection to prevent the functional and cosmetic defects appearance. The acoustic method is applied for differential diagnostics of the scar types by Pligin [3]. A scar change is followed by the surface wave V value increase in comparison with the speed in the intact and visually healthy skin V_n . As per standard clinical parameters all scars under investigation were divided into 3 groups: uncomplicated (normotrophic) scars; hypertrophic and keloid scars. Fig. 2 represents empiric densities of propagation speed of the surface wave for the scars of different type.

Based on these graphics one can perform previous evaluation of a scar belonging to a certain type.

Histological analyses of hypertrophic and keloid scars has shown the following. Epidermis thickness in a keloid scars is more comparatively to the hypertrophic one; Stratum Lucidum is more prominent in the keloid scar; collagen thickness is more in the keloid scar; collagen fibers orderliness is available in the hypertrophic scar, in the keloids one the collagen fibers orderliness is almost not expressed; fibroblasts infiltration is more expressed in the keloids.

Comparison of the histological data with the acoustic parameters enables to approach to the understanding of a tissue structural organization influence on its acoustic characteristics.

Based on the acoustic data, to make the diagnostics of a tissue with scar changes objective, there was chosen a quantitative parameter $Z = V_c/V_c$, table 3.

3) Post burn scars

The children's post burn scars were investigated by Soboleva [4]. Scar type determination was performed by the acoustic method as per Z parameter and clinical features which were observed.



Fig. 1. a) Subcutaneous hydrocarbon gel location, around it one can observe a thin capsule (¬); b) encapsulatedhydrocarbongel (g), capsule (k), derma (d), epidermis (e)



Fig. 2. Empiric densities of propagation speed of the surface wave for the scars of different types



Fig. 3. Normotrophic scar, ageof 1 year 6 months, corresponds to the clinical features of this scar type:
1) over a large area the epidermis is clearly structured; 2) papillary and reticular dermis are distinguished; 3) thin collagenous fiber bundles with separated fib

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For the morphological investigation there was taken a part of the scar in which the scanning was performed. The morphological investigations results are shown on Fig. 3, 4, 5. (Colouring withhaematoxylin and eosin.Increase ×100).

Table 3 represents the acoustic and morphological features of three scars types.

Thus, principles of the surface wave spread rate changes in different scars types, determined in the works [3, 4] correlate both with clinical features, and morphological features of these scars.

4) Sclera

The work [2] represents studies of maturity degree of rabbits' eyes sclera influence on its

acoustic and morphological parameters. The experimental animals underwent sclera collagenous plastics (introduction of collagen hemostatic sponge into the Tenon's space). The investigation was performed in 4 areas of posterior sclera (upper-external, upper-internal, lower-external, lower-internal). Measurements were made in two mutually perpendicular directions.

The acoustic investigations have shown that sclera tissue with low maturity level (1 month after surgery) has lower values of the surface wave spread rate than that with higher maturity level (4 months after surgery). Results of the acoustic imaging are represented in Table 4.



Fig. 4. Hypertrophic scar, age1 year 6 months, corresponds to the clinical features of this scar type: 1) epidermis is thickened with dyskeratosis signs and absence of its normal layers; 2) papillary and reticular dermis are slightly distinguished; 3) collagenous fibers are of middle density



Fig. 5. Keloid scar, age 3 years, corresponds to the clinical features of this scar type: 1) epidermis cellar layer is absent; 2) collagenous fibers bundles of different directions and separated; 3) small cells quantity

Table 3

Table 4

Normotro	phic	scar	Z=	109-	-116	%
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Morphological features: epidermis moderate atrophic and dystrophic changes; lateral and parallel location of collagenous fibers and bundles;

Predominance of fibrocytes over fibroblasts;

Capillaries pausity;

Moderate vasculitis;

Significant amount of elastic fibers.

Hypertrophic scar Z = 130–140 %

Morphological features: epidermis dystrophic changes; orderly arranged powerful collagenous bundles; Fibroblasts predominance with signs of dystrophic and parabiotic changes;

Numerous capillaries with productive vasculitis signs;

Big amount of elastic fibers which have linear organization and oriented as per collagenous fibers bundles. Keloid scar Z = 198-228 %

Morphological features: big amount of functionally active fibroblasts with presence of the giant cellar forms; Functionally active capillaries reduction;

Collagenous fibers myxomatosis;

Absence of elastic fibers; small capillary amount

Topographic zones of	Superficial waves rate V, m/c								
posterior sclera	After 1 month	n after surgery	After 4 mont	hs after surgery					
	Imaging	directions	Imaging directions						
	У axis	X axis	У axis	X axis					
upper-outer	$54,7 \pm 0,7$	$57,5 \pm 0,5$	65,1 ± 0,8	63,1 ± 0,9					
upper-inner	53,6 ± 0,8	53,6±0,8	$62,4 \pm 0,8$	59,6 ± 1,2					
lower-outer	$56,2 \pm 1,0$	$55,1 \pm 1,7$	$62,3 \pm 0,8$	$65,9 \pm 1,1$					
lower-inner	$52,4 \pm 1,1$	$54,4 \pm 1,4$	$64,3 \pm 0,9$	$64,3 \pm 0,9$					
P < 0,05	<u>.</u>	•		·					

	Table 5
Morphological features after 1 month (low maturity level)	Morphological features after 4 months (increased maturity level)
Low maturity level of the differentiate sclera fibroblasts which is expressed in fibroblasts proliferation, tissue granulation growth as well as structural randomness of the sclera collagenous fibrils is peculiar for smaller surface wave rate values.	Increase of newly formed sclera cellar maturity level is expressed in the granulation tissue maturity and its refor- mation into a fibrocicatrical one; Fibrous tissue is peculiar for its significant thickness; collagenous fibers of connective tissue body have ar- ranged path, significant thickness, high collagenous blast activity is preserved.

The obtained results witness that sclera maturity level causes an increase of the surface wave speed both in transversal and lateral directions.

Table 5 represents morphological data comparison after 1 month after surgery (at low maturity level of the newly formed sclera connective tissue) and after 4 months after surgery (after its maturity level increase).

Thus, according to the surface wave speed increase one can conclude the sclera maturity level.

The work [2] also represents that the same dependence of the surface wave propagation

speed on the maturity level takes place in a cornea too.

Conclusion

Based on the results represented in this work one can conclude that the acoustic features of different tissues which are determined by the non-invasive acoustic method, properly reflect the tissue structural peculiarities. Simplicity and high informative capacity of the non-invasive acoustic method in some cases allows using the acoustic scanning instead of diagnostic biopsy.

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THE ROLE OF SOCIO-ENTREPRENEURIAL CORPORATIONS IN IMPROVING ECONOMIC COMPETITIVENESS OF THE REGIONS IN THE REPUBLIC OF KAZAKHSTAN

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Partnership approach between government, society and business is a secure foothold of any state's sustainable development. The new chapter of entrepreneurship development is development of socially responsible business in Kazakhstan.

Keywords: corporation, competitiveness

The head of the state made a pointed reference to its role and contribution. In particular, the main idea is to form socio-entrepreneurial corporations which would support social infrastructure in the regions where they carry out activities, not only functioning as ordinary business structures and making profit. In other words, business must be involved in projects which are connected with education and healthcare, sport and culture development, environmental protection.

Socio-entrepreneurial corporations are actually assigned as the basic mechanism to provide an economic and social leap-ahead of the state up to Kazakhstan's inclusion into the world's 30 Largest Economies [1].

Nowadays, there are no cooperative, mutually beneficial economic relations between regions of Kazakhstan, while cooperation between each several of them and neighbouring countries and beyond is growing rapidly.

On the one hand, it definitely works positively, but on the other it's not always feasible for the purposes of domestic production development, because it entails extremely lap-sided development of the regions. For instance, according to the scale of innovative constituent, by WEF's criterion, which involves the unique value -1, only Almaty achieves this mark (the quotient is 1), followed by Mangistau region with the quotient 0,4. Rest of the regions ranks below 0,1.

Generally, programs worked out in the center, including cluster-based and regional development investigations, barely get to the regions. In this matter SECs are aimed at providing direct bilateral "center-region" connection, achieving both the routing of innovative decisions and technologies to the regions and regions' self-development.

As opposed to developed countries with established economic and social system and sprawling infrastructure, in Kazakhstan concerns of territorial development claim an effective coordination.

As global experience confirms, socio-economic development of a state directly depends on its regions' competitiveness. In the age of globalization state's economic progress needs not so much production value and resource endowment, as territorial concentration of economic activity which satisfies the global standard demands. "Territorial competitiveness" refers to its capacity of getting high, constantly growing quality of life by means of increase in labor productivity and efficient use of capital. Regions which are able to meet competition use the opportunities to enter the global market acting as important elements in the system of financial, technological and cultural exchanges. The regions' stabilization in global exchange system enables the country to win competitive positions worldwide and strengthen its geoeconomic status.

Thus, summing up what has been said, SECs are aimed at improving competitiveness of regional business, ensuring organizational attributes and economic conditions for attractive investment climate and development of infrastructure for innovative activity in the region [2].

gion [2]. SEC is sort of a regional institute for development and might be represented as a holding company managing state assets in a specific region of the country. The conception of a national holding company managing state assets has attracted intense attention in many developing countries and is currently central at the modern stage of Kazakhstan's progress. Basic philosophy, which guides governments' actions, consists of gaining the guarantee that state companies and organizations which have state assets at their disposal are able to meet competition and are able to meet requirements of market economy and conduct efficient business.

In Kazakhstan the state assets management is historically based on the conception of economy which functions under conditions of budgetary funds deficit. In 1990s the government was privatizing state-owned property in order to refund the lack of budget and attract investments in loss-making public enterprises. State investments were mainly addressed to institutional reforming and building social and infrastructural assets. These processes took place in time of economic crisis and overriding need of macroeconomic stabilization.

One of the tools executing strategic and coordinative functions in economic processes is establishing the institutes for development which are aimed at realization of socioeconomic projects in cooperation with other stakeholders. Upon commencement, all the institutes for development have gone through the processes of organizational establishment and now they have their own specialization and prospects for development.

At a later stage, according to expert opinion, with the gain in managerial experience and improving capitalization of SECs, extension and diversification of their "field of responsibility" will be possible, including the entry into regional and international markets [3].

The activity of the corporations is addressed to attraction of new projects, small and medium enterprises development and consolidation of corporation's role.

Social and economic development of the republic is physically impossible without active involvement of private sector. Nowadays private structures shouldn't be out of problems connected with development of the region where they carry out activities. In this respect, social responsibility of private business is not only investment of profits in social projects, but also creation and conduct of competitive business, creation of new production based on loss-making enterprises, efficient use of stateowned property. One of the key objectives of SECs was creation of effective mechanism for crisis-management specialized on rehabilitation of non-performing state and communal assets. In this context, communal assets are, most notably, infrastructure assets (public water supply, wastewater disposal, etc.). At present, according to the document prepared by the work team, this notion is defined in the following way: "SECs are steady business entities operating for the purpose of receipt of profit from goods and services production and sales".

The purpose of SECs turned to "provision of regions' leap-ahead by means of economic diversification, creation of effective system for corporative management, state assets and entrepreneurial initiative consolidation for socio-economic task solution". Thus, SECs, having considerable and liquid state assets at their disposal, are able to attract long-term capital under favorable conditions for realization of regional projects. The proposed way of capitalization and highly professional management of SECs brought the possibility of attraction of foreign investors in joint regional projects which would promote advanced innovations and high-technology products introduction.

The main objective of SECs is to make money for each viable social project. For this purpose at these days the government is capitalizing SECs by means of treasury funds and sets them as domestic companies.

The conception of SECs doesn't put the purpose of state assets recovery and, if possible, its transfer into competitive landscape. Nowadays the SECs' objective is to become a self-sufficient active player in the market. In particular, entrepreneurs used to appeal to the government and gain the right for land appropriation in order to implement a business-project, then as now, according to the government's idea, they will have to appeal to the SEC.

The regional economic system integrity is evident as the interdependence of production development in a region, while allocation of new industries is rated not only on return of investment, but also on its consequences in consideration of SEC's functioning in general.

In perspective, SECs will help in improving existing social circumstances in regions by means of solving following issues:

 involvement of broad spectrum of economic entities into economic processes, attraction of foreign investments;

 – creation of demand for corporate goods and services on a long-term commercial basis; product promotion in domestic and foreign markets;

- intensification of connectivity between small and medium-sized business entities and large financially secure enterprises for the purpose of clusterization;

- creation of clusters and indispensable conditions for the purpose of cluster-based consolidation of enterprises and creation of new enterprises;

- promotion of region's economic image in domestic and foreign markets;

- productivity improvement of small and medium entrepreneurship on the basis of clustered production development and introduction of new technologies;

 rehabilitation, restructuration of national enterprises; creation of new competitive production and technologies on the basis of current national enterprises;

- business-projects base building, financing and arrangement of conditions for implementation of business-projects;

- generation and financing of projects aimed at social development of the region [4].

SEC will improve social circumstances in regions by means of creating new vacancies, small entrepreneurship development, implementation of social projects, provision of rival products for the domestic market and economic development of the region in general.

As the result, SECs are of key importance for modernization of country's economic system. SECs are big employers and growth drivers, regional "growth spurts" of national economy. That way, the government concentrates on generation and implementation of strategic and political objectives within the General course on the entry into top 30 most competitive economies in the world and creates transparently working market mechanism for the development of big domestic business, small and medium entrepreneurship, boosting employment of population and raising of living standards [5].

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RELEVANCE OF EFFECTIV MANAGEMENT OF STATE OWNERSHIP

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Relevance of this problem is caused by need of ensuring safety, stability, development, effective functioning and use of all set of objects of state ownership for national interests.

Effective management allows to maximize results of use and the order of objects of state ownership. Therefore, requirements of effective management of state ownership constantly are in number prime, shown by society to the elected public authorities, and, respectively, find reflection among the prime problems solved by them. In the Russian conditions they have certain specifics and gain, to a certain extent, still bigger value.

Now the problem of effective management of state ownership is developed not sufficiently. In this regard, there are no mechanisms which would allow to increase effective management of state ownership sufficiently.

Thus, the problem of ensuring effective management of state ownership demands comprehensive study as is one of key problems within a control system of state ownership. Detailed studying of such measures for ensuring effective management of state ownership as optimization of structure of state ownership, improvement of financial and economic indicators, and also introduction of the latest standards of corporate management, including, widely used in the international practice in jointstock companies with the state participation and the federal state unitary enterprises is also necessary.

Relevance of this problem is caused by need of increase of efficiency of the activity of joint-stock companies with the state participation having considerable impact on state of the economy of the state.

Need of effective management of the state property for open joint stock companies is caused by such reasons as:

- ensuring performance by joint-stock companies with state participation of nation-wide functions (defense, safety, social programs), a problem of preservation of economic security of the country from internal and external threats;

- the increase in the non-tax income of the federal budget creating prerequisites for decrease by the state in taxes on results of activity;

- production development stimulation, improvement of financial and economic indicators of activity of legal entities, attraction of investments;

- implementation of institutional transformations in economy.

Now the problem of increase of efficiency of an management state ownership in joint-stock companies is developed not sufficiently. In this regard, there are no the mechanisms of control and regulation of efficiency of activity of joint-stock companies with the state participation considering branch specifics, and also features of activity of these societies.

Thus, effective participation of the state in open joint stock companies is one of the major tasks which face the state in modern conditions of the Russian economy. Therefore, such question as management of joint-stock companies with the state participation deserves special attention.

Relevance of this problem is caused by need of increase of effective management of state owner-ship for joint-stock companies.

However to provide effective management of state ownership in open joint stock companies careful and timely control of their activity is necessary.

In a control system of state ownership the mechanism of control represents a form of realization of a feedback mechanism. As a result of accurately organized control feedback between object of management represented by joint-stock companies and the subject of management representing the state and municipal device is carried out. The mechanism of control has to act on all stages, in all subsystems of management of state ownership.

At the moment the problem has an insufficient scientific and practical readiness in spite of the fact that it is a one of key within state regulation.

In scientific literature there are various points of view concerning a control technique which would be the most effective in aspect of management of state ownership.

On the one hand, problems of financial policy of the state can define the purpose of the state financial control in the sphere of management of state ownership as ensuring compliance of the maintenance of the property relations in the sphere of management of state ownership.

In addition, there is a point of view that in relation to management of state ownership of function of control have two main objectives:

providing objective feedback in a control system of the state financial and material resources of society;

 realization of the rights of citizens and the organizations on receiving reliable information about use of public funds and material resources of society.

Efficiency of functioning of a control system of state ownership in many respects depends on efficiency of operation of mechanisms of control. All this specifies that the key place in a control system of state ownership is allocated for control.

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This article showed that among approaches for undershending the subject of philosophy of education support has got its definition such as manner of peace and post of person in the world.

Keywords: philosophy, education, principles, conception, acseolog

In the philosophical tradition of the problems of education had independent significance, rather, they were applied nature. Some ideas about the processes of training and education and the theoretical basis for teaching activities can be found as shown in the first section already in Plato and Aristotle. Pedagogy is not yet separated from philosophy and served as one of the aspects of the application of philosophical doctrine. This, above all, was about becoming a man virtuous and knowledgeable. At the same time, it was considered becoming something other than mastery of Art. Actually philosophy of education has not yet taken shape in any form of the concept, nor as an isolated system of views. Apparently, she begins to take shape only in the Middle Ages, when there is systematic training and formed a circle of school disciplines; there are tutorials and stable institutions. Gadamer, referring to the thesis Schaarschmidt, notes that the term "education" has its origins in medieval mysticism Baroque. "The final sanding of the term, stimulated Herder, - he writes - over between Kant and Hegel" [1]. Gadamer also mentions him close understanding of education in Herder and Humboldt. Moreover, in Herder it is thought of as the rise to humanity, and at the Humboldt – as the pursuit of the spirit of humanity.

The philosophical concept of education contained in the Philosophical propaedeutics Hegel. Defining a person as being twofold, Hegel sees the duty of man to himself is to: become a cultural being through education. He writes: "Man as an individual to treat himself. He has two sides: the individual and the universal essence. In this regard, it is a duty to the part of the physical preservation of themselves, and in part to raise their separate entity to its general nature – the form itself" [2].

The latter is necessary because of the fact that man is by nature not be what it should be. Thus, he talks about some artificial process that requires special attention and effort conditions. However, later in this paper on the process of education, he does not stop, and only describes the state of education through its priznaki separately for theoretical and practical education. From the point of view of philosophy of education can be interpreted other work of Hegel: "In all that man becomes something internal, general performance, all that he is doing his own, entered the language, and all that he turns into a language and expresses in language, contains hidden there, coiled or a developed form, some categories, to the extent it is natural for a logical or, more correctly, the latter is itself its inherent nature" [3].

The body

However, life is not squeezed into the narrow confines of reproductive structures; inevitably there is a selection of reproducible elements and all kinds of simplifications that – as expected – should facilitate the transfer from one generation to another fact, the main frame playback society, leaving behind brackets irrelevant or obvious. While education is not considered a separate subsystem, this transfer was carried out through the "getting used" and thus could ensure the integrity of the transition of society from generation to generation. If this process is not successful, then it leads to deformation of the human person, and, consequently, of society itself. Therefore, attempts are being made to understand the research process and to identify the conditions for its normal functioning. However, the nature of education has to be judged only by circumstantial evidence. Hence the desire to reveal it through its results, or the activity by which it is carried out, or a natural process that is behind it. If we try to understand how education is understood today, it is brought before us in a frame of complex categorical connection. It refers to both the process and the structure, quality and condition, and the form and content of the activity, it is both natural and artificial, subjective and objective, etc. And for each of the categorical definitions is its own special significance and appropriate subject content.

The question of thinkability education is: firstly, the question of its representability by the means at our disposal means thinking and, secondly, the question of its givens in some objectified forms. The third aspect of this question is

related to the efficiency of thinking about education, which implies the need to correlate with the actual processes taking place with the community and education, ranging from changes in organizational forms and ending with what is happening now reviewing the whole ideology of education. First of all, education is associated with two processes: learning and development. The fact that these processes are took place or in any of its stages can be judged by the intermediate and final results. These processes as they relate deeply and comprehensively dealt with in pedagogical, psychological, philosophical and methodological studies (Rubinstein, Vygotsky, Leontiev, Galperin, Piaget and others.). Heated debate on training and development was developed in the 60s. In particular examined the roles of these processes are in the society and its relationship to culture. This material is still waiting for a special analysis, especially in terms of philosophical development of the proposed approaches to the study and design of these processes in a broad social context and related fundamental methodological problems.Erich Fromm believes that the learning process and its result are fundamentally different depending on what his main form of man's relationship to the world, from the mode of its existence (mode of existence or mode of possession). When targeting "possession" the result of the learning process becomes a certain amount of information assigned to a person, but remained for him something external tool that can be used to achieve some goals, and the generation and social characteristics assigned to the educated person and the associated her social status. In the case of orientation to life the learning process becomes getting used to the element of thinking, knowledge and change in student substance for which the acquired knowledge becomes their own, internal, part of him.

Both in terms of research and in terms of planning is one of the central problem of educational content. Reference to the process of learning and development allows you to bypass many difficulties that arise here, for example, the content of consciousness. After all, the content of education is largely determined by the content of these two processes, although it can not be completely reduced to them. Learning content is presented in the relevant educational subjects and samples of activity and thinking exhibited by the teacher. The content development may be recorded, for example, using research procedures developed in psychology. Yet the content of education as a certain level of education, allowing a person to navigate freely and consciously act not in vitro study situations and problems, and in terms of social (material and spiritual) production, in real social and cultural situations of interaction with other people, there is still understudied. Identify the residue apparently can be turned to the content of those branches of knowledge and activity, which should be free to feel educated specialist and analyzing the difficulties faced by graduates in practice.

It should be noted another point of educational content, at which point John. Art. Miles as indispensable for university education as opposed to professional. This ability to navigate in the field of human knowledge, the ability to grasp the relationship between the individual items, special methodical look at things, which allows you to operate with the new and unknown, based on the knowledge of the whole. For the formation of the content of education offered to introduce courses in philosophical subjects.If philosophy owes much to education, because education is and no less obliged to philosophy. In the depths of philosophy have been developed not only the key concepts and ideas that are used today in the theory of education, but also those concepts and ideas that are an indispensable part of the arsenal of modern thinking means an educated man. Such a close relationship allows a simple answer to the question of whether there should be a philosophy of education. Moreover, the latter is necessary as philosophy itself, if it wants to be effective, efficient, and a society that is committed to the progressive development. After all, without a full understanding of what is education and what is its place in society, it is impossible to get a true picture of society, and the picture of the world as a whole. After all, education is largely determines the vision, the forms of representation of reality, within which the socio-cultural or significant effect on the different levels of the social system.

Thus the status of philosophy of education is very difficult to determine. As you know, philosophy literally means "love of wisdom" (from trech. – I love -mudrost). There is a variety of meaningful interpretation of the term 'philosophy": a form of social consciousness; the doctrine of the general principles of being and knowledge of man's relation to the world; science of the general laws of nature, society and thinking, etc. To the question "What is philosophy?", Apparently, is to follow a twofold answer: both science and ideology. Meanwhile, very often deal with one-sided polar views. So, for example, M. Mamardashvili, "philosophy is not a system of knowledge that could be transferred to others and thus train them. The formation of philosophical knowledge - it is always an act of domestic ... Moreover, philosophy, as I understand it, and there was never a system of knowledge ... In short, philosophy – it's design and development to the limit states

using universal concepts, but based on personal experience" [3].

The main thing – do not consider themselves superfluous in this world. Imagine what the world would be completed, and is regarded there is some great theory that explains what the thought that this is a reason that is love. If it were so, then why worry about individual feelings of love. But the feeling of love is still there. The question is, what my feelings if it was a million times. What's the point? So the world is like an unfinished process. My feelings are unique, unrepeatable. Otherwise, did not need any of my feelings or my experiences. My experience could only be idiotic. As Shakespeare said, the world would be a fairy tale full of fury and noise, tells an idiot. Consequently, the world is constantly evolving, changing and there is always a place for me there, if I'm ready to start over, to pass his life itself, though it may be a lot of repetition, borrowing.So, philosophy – it is solely the personal outlook, attitude, based on the experience gained individually. In other words, philosophy – not a science ... Let us compare, however, this statement with the following: "Since philosophy is a science – read in Yu. Bohenskogo – the philosopher should be only one goal – knowledge. Therefore, any other motive philosophizing, for example desire to convince in something other, protect any point of view, and so on - can not be called honest ... In the study of philosophy is guided only by the desire for knowledge" [4]. Denying the extreme, we still adhere to this view: philosophy – a system of knowledge, a science, on the basis of which produced both individual and mass (public) worldview. But at the same time - it is a science, as if inspired, science, based not only on purely formal logic in the interpretation of the extracted knowledge, but, above all, on the relation of man to the knowledge in terms of spiritual, moral criteria, informed and taken internally them.

These extreme points of view related to the recognition of the importance and role of philosophy, found mainly in the works of professional philosophers. It is necessary to recognize the existence of certain negative trends in philosophy and other social sciences and humanities in the post-Soviet space. This is due both to discredit the social sciences, as apologetic doctrines of the old social system, and causes of socio-cultural order.Our Kazakh scientist Mukhashev ZA gave the following plausible explanation: "The process defilosofizatsii social consciousness is primarily associated with the birth of mass culture, which antifilosofichna on the merits. It systematically reproduces the conditions of rejection of philosophy, and attempts to keep the latter is in vain. Even an unparalleled extension of the notion "philosophy", for example, the emergence of phrases such as "the philosophy of tea", "philosophy of life" and so on. are a manifestation of mass culture" [5].

For many years it was thought that the Marxist-Leninist philosophy – this is the philosophy of education, we need only to interpret the general philosophical position in line with the educational issues and give them educational and pedagogical coloring. As for chastnonauchnogo philosophical knowledge, it is considered an intrinsic methodology of pedagogy. Not by chance in almost all publications on methodological educational and pedagogical issues traditionally pays tribute to general philosophical canonical provisions, and in the best case, only adapted to the specifics of education, and at worst – mechanically, technically advanced on this area of public life.

Currently identified three basic approaches of the determination, of the status, of philosophy, of education. The first relates to the assumption that the philosophy of education, as well as many other industries chastnofilosofskogo knowledge, there is a specific applied philosophy. With this approach, it is considered that it is sufficient to use general philosophical position to justify the status of education and the laws of its development in the most general terms and in relation to the value-targeted, systemic, and procedural aspects of effective multidisciplinary educational activities. In fact, it is such an extremely lightweight and quite formal approach is used to characterize the status of philosophy of education in many countries, particularly in the US, and multivolume editions devoted to this field of knowledge, and even tutorials on very specific issues of education abound with endless comparisons most different philosophical schools and movements and attempts to illustrate the usefulness of direct application to the solution of philosophical knowledge of specific educational problems. Not by chance in the English version to describe this area of philosophical knowledge, along with the phrase "Philosophie about!" Eëisayop "is often used, and the phrase" Philosophie APS! Eyisayop. "With this approach, it is not so much about the philosophy of education, but about philosophy and education"

Such interpretation of the status of the philosophy of education is shared by many Russian scientists. For example, in a fairly typical for such an approach N.G. Alekseeva presentation: "The philosophy – not a science, and science – not philosophy ... Philosophy (including the philosophy of education, ie, philosophy, addressed to education) updated in anticipation of major changes affecting all areas and aspects of social life, and it becomes really acting theory, actively influence the practice ... The essence of the philosophy of education – philosophy, turned to education, understood as a template reproduction of society ...". [6] This statement draws attention not only focus on the application status of the philosophy of education, but also denial of the scientific content of this field of knowledge in general ... This philosophy of education imparted some momentary functions callable only in conditions of great changes in the development of society, and it is in this time it is allowed to become a functioning theory, that is, to find, at last, some scientific status. The above "applied" the concept of philosophy of education, sometimes beyond the scope of individual assumptions and opinions and is proclaimed in a fairly serious international instruments. So, in the final report of the "philosophy of education in the perspective of the XXI century", summing up the re-sults of the International Symposium in Prague (1990). Says: "Among the approaches to the understanding of the philosophy of education support for its definition as" the image of the world and man's place in it. "More specific definition of educational philosophy focused on cognitive, methodological, design and function akseologicheskoy philosophy regarding education" [7]. Clearly consciously identified with the philosophy of philosophy of education in general, leaving the latter the right to exercise their functions with respect to education ...

Uncertainty of the status of philosophy of education, naturally produces the temptation to use a fashionable phrase, when virtually any educational problems are more or less general nature are brought under the phrase "philosophy of education". A typical example of such an appeal to the visual appeal title -in general, very interesting work P.G. Schedrovitskogo "Essays on the Philosophy of Education", in which you can find ideas on the system of training, active forms of learning and educational content, the basic ideas of "sistemosmysldeyatelnostnoy pedagogy" and even a "pedagogy of freedom", which are essential in themselves in terms of content itself. It is not clear, however, why, in fact, all these really urgent and important issues to be discussed under the heading of philosophy of education, what distinguishes a system of philosophical and educational knowledge of unsystematic knowledge, local, "snatched" from the context of the general philosophical doctrine of education ... ? [8] The danger of hasty, premature institutionalization rightly pointed N.S. Rozov. Indeed, the introduction of new categories and concepts in science, especially those that claim to be the proclamation of fundamentally new fields of knowledge, requires special care, because in this case instead of the areas of research activities and to enhance its effectiveness it is easy

to fall into a state of full scientific and institutional voluntarism and chaos. .. "Philosophy of Education, writes N.S. Rozov – begins its life in the original isolation from the real problems of education and educational policy. This first danger I call scholastic instigutsializatsiey ... logical mechanism is designed to connect the general philosophical ideas through the circuit specification with educational decisions, projects and programs of reform, practice training and education" [9].

If the first part of this statement raises no objections, the reliance on a logical mechanism that would connect the "general philosophical ideas" with educational decisions, again reduces the philosophy of education to the level of applied general philosophy. In another words, again and again held the idea that only deductive spread of philosophical knowledge on education can lead to the formation of the philosophy of education.

Unfortunately, even the most fundamental authoritative publications on theoretical grounds of education, sin is full of uncertainty in the characterization of the status of philosophy of education. For example, in the section "Philosophy of Education" at the end of the XX century published "International Encyclopedia of Education" in 12 volumes includes articles on curricula and programs to all the world's religions and philosophies of the XX century. Commenting on this extensive list, N.D. Nikandrov writes: "Set a show. First, it is striking that in some cases belonging to the philosophy of reference specifically states" philosophical foprosy because otherwise it is clear that the issue is related to the philosophy. Secondly, it really is the most common, and in this sense the philosophical questions of education and science of education, especially teaching. Third, one article is not only in this list. It is available in both: in the category "Pedagogical research. Methodology and measurement" ... Thus, there is some overlap in our traditional common methodology of pedagogy and philosophy of education".

Thus, at a sufficiently high level of international educational philosophy or interpreted in a very broad form with access to general philosophical doctrines (positivism, scientism, empiricism, relativism, realism, postmodernism, existentialism, pragmatism, neo-Thomism, personalism, etc.), or coincides with pedagogy, encroaching on its identity and self-sufficiency.

Actually, the second approach to the interpretation of the status of the philosophy of education is precisely to mobilize conservative, defensive resources pedagogy, in order to prevent such an attack and leave all the common issues of education in all its many facets exclusively for themselves ... Thus, generally placed questioned the appropriateness of the development of philosophy of education as an independent branch of scientific knowledge. Enough, it turns out to solve all the difficult questions of a philosophical nature in the methodology of pedagogy or general pedagogy.

Findings

A third approach to understanding the status of philosophy of education is fundamentally different from the previous two. At its heart – the harmony of deductive and inductive logic of becoming a full-fledged philosophy of education as an interdisciplinary branch of scientific knowledge. Of course, the proliferation of philosophical ideas and positions on specific education and may continue to need. Especially that pluralism of philosophical approaches where more democratic and more attractive than strictly required to follow the only philosophical doctrine and caused it monoideologicheskim standards. But it is actually ignored logic of the philosophy of education, when the flow of ideas that reflect the problematic situations in all aspects of the practice of broadly understood education alone can give vitality and specific targeting formed the philosophical and educational knowledge, which does not exclude, of course, data assimilation of different sciences, including general philosophy. In-depth analysis of just such a course of development of the philosophy of education is extremely important.

Thus, the philosophy of education – is not applied philosophy. This is quite independent area of scientific knowledge, the foundation of which are not so much the general philosophical teachings, turned to education as the objective laws of development of the education sector itself in all aspects of its operation.

General philosophical knowledge alone will remain only an abstract scheme, unless they are enriched with knowledge related to economics, sociology, ethics, aesthetics, culture, ecology, different fields of engineering and technology, computer science, physiology, medicine, law, demography, education, psychology etc. And each of these sciences considers the problems of education in its aspect, in its particular perspective.Philosophy of Education, assimilating all this knowledge in their most general, conceptual form, is essentially a scientifically based research paradigm, meaning (for Kuhn) "recognized by all the scientific advances that have for some time given model posing problems and their solutions to the scientific community" [9].

In general, among the most pressing problems of modern education to be social and philosophical reflection and hence constituting the content and structure of the philosophy of education must include the following:

1. The conditions and possibilities of full self-realization in the period of transition from socialism to capitalism society.

2. Search for a way out of the former imposed, the Soviet system of philosophy and thinking zaideologizirovannogo perception of all phenomena of social and natural world, change in the overall mental attitudes towards the world and society.

3. Problems of quality to meet the rapidly changing social order to the new structure of Humanities and technologically saturated professions, development and implementation of training competent paradigm of modern professionals.

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PROBLEM ORIENTATION OF SPIRITUAL ACTIVITY

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In order to comprehend activity of a person in a given time period, we must evaluate not only spirit as it is, but also its direction in time and force. A spirit is identified from the first sight. It is a totality of actions that are happen in exact way, not another, aspirations, as special phenomenons that are concealed but at the same time closely interlaced with all consequences and circumstances. We can study spiritual life of a person as an object of imitation and standard of behavior, considering how its activity reflects in a given epoch. Life of a person does not only consist in life for one's self, but mostly in life outside of our bodies, life for the others. Time period that is given to a person for life, even it is filled with creativity, is limited from one side by the finiteness of their mission, and from the other side by inflow of new people: children, supporters. We should add the fact that most often noble spirits

fail to find application, whilst vile intensions can integrate one's life with ease. Ideas and thoughts, comprehensible for the majority, must be comprehensible for their consciousness. Therefore, all tutors face unacceptance of their ideas. Knowledge in itself comes first, but not a tool that can applied in real activity. But, committing truly moral acts lays above common human consciousness. Here is why all truly great is created rarely, and if it does, it emerges exclusively in hard conditions.

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ELEMENTS OF MATHEMATICS WITH KAZAKH PEOPLE'S ETHNICAL COLOURFULLNESS ON AN EXAMPLE OF YURT

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This paper considers application of mathematical elements in socio-cultural life of Kazakh people on an example of yurt. This article refers to "Golden ratio' proportion to define the most effective type of dwelling for life. The form of the home, parts of it facing in all directions; material from which built a house, texture, colour, quality components that make up the tent, all this is connected with the notion of ideological architecture – the keeper of family well-being of ancient Kazakhs. During the study it uses formula widely spread in architecture. It is called the coefficient of comfortable dwelling, now K value is equal to 1, and this is possible only for a sphere, and the coefficient does not depend on its radius. The larger K is, the larger cubic capacity can be obtained per unit area. As a result, it concludes that of all kinds of home comfort yurt isoperimetric ratio is close to unity and hence yurt – the most acceptable and convenient form of housing.

Keywords: Kazakh yurta, golden ratio, dwelling assessment, isoperimetric ratio of comfort

At all times mathematics has been of a great support to people and their lives. People could do mathematical counting and were studying geometrical figures when they hadn't learnt writing yet. At the time when handwriting appeared and the system of numbers came to use and soon mathematics started developing as a science. Why was mathematics necessary in ancient time? It was a great help for practical, commercial purposes, for example surveyors to measure land areas, i.e. served for many other purposes. Mathematics gradually came out of human practical needs. The game with figures and numbers was not only an instrument but end in itself. In process of mankind development there appeared new appliances of mathematics aiming to solve specific practical tasks.

Building dwellings which served as a shelter from unfavourable weather, for sleep, nurturance, storage, rest and responsible for ability, requirements to keep warm had been the most important tasks in mathematics for a long time. People had been fighting to keep warm in different ways for ages. For this purpose dwellings were deliberately reduced in space and also various covering materials were used. At the same time people faced a problem: how to provide as much space for the dwelling as possible at the lower surface and shape. The problem was that they didn't know what dwelling shape is more comfortable for life in correlation of its space to heat loss through its surface. As a consequence the solution of this problem was related to geometrical shape of dwelling. It was proved that one of the ways to keep warmth is providing dwelling with the lower heat loss through its surface.

On this occasion dwelling space had to be reduced, but a person should have a quite amount of space to feel comfortable. At this point people arose the question of how to achieve maximum possible combination of space of dwelling at the minimum surface area through which the heat could escape. Primitive people came to the decision of this problem by actual experiments.

Kazakh people had different construction materials to cover dwellings but used to work with felt characterized as high heat-keeping material in the condition of local climate.

In the course of adaptation to environment, creation of an art and cultural community of accommodation, people came to a conclusion that creation of mathematical and architectural reasonings, geometrical forms could sometimes lead to quite unexpected results. Therefore when studying geometrical materials, as it turned out, it is important to find the subjects having a form of geometrical figures in world around to mark out their major properties.

To solve this task, you must answer the following questions: Is it possible to compare the two buildings and determine which one is better? What is the most comfortable home? The building, which is the cheapest form? How to take into account the ability to home to keep warm? Why cat in cold weather curls into a ball? Why kettle has a spherical shape? Is it related all this to the conservation of heat? The answers to all these questions are isometric theorems of geometry.

Comparing geometric shapes, ancient people understood the meaning of the existence of isometric theorems. Their meaning is as follows: on the area among all closed curves of a given length has the largest area of a circle, and of all closed surfaces of a given area of the largest volume in the world [1]. All these properties are intuitively understood the ancient people and used them in my life; Kazakhs in the choice of forms of home-yurt.

The person uses the word in the sense of the proportion of harmony and beauty. Proportions in architecture is one of the most important means of creating an artistic and aesthetic image. Practice has shown that using them can be expressed monumentality, solemnity, or, on the contrary, modesty, simplicity, naturalness. With the use of a proportional system – proportionality whole and its parts – it is possible to create a visual lightness or heaviness. The visual expression is largely provided by well chosen proportions.

The standard of beauty, get with the light hand of Leonardo da Vinci, the name "Golden ratio" ("Divine Proportion") (Luca Pacioli) is a division of a line into two parts, where the smaller of these applies to most as great to the entire segment [2].



Fig. 1

We compute, for any part of the shares "Golden ratio" unit interval. In this case a + b = 1, b = 1 - a, where $\frac{a}{1-b} = \frac{a-1}{1}$, hence $a^2 - 2a + 1 = a$, $a^2 - 3a + 1 = 0$, $a_{1,2} = \frac{3}{2} \pm \sqrt{\frac{5}{4}} = \frac{3 \pm \sqrt{5}}{2}$. Since 0 < a < 1, we have $a^2 - 3a + 1 = 0$; $a = \frac{3}{2} \pm \sqrt{\frac{5}{4}}$; $a = \frac{3-\sqrt{5}}{2} \approx 0,382$, $b \approx 0,618$.

Due to the human eye is not any relation, but only those that are in relation to the proportion of the golden section are universal for all the phenomena of nature and art. Proportionality parts of the building, the human body, plant growth – all subject to this rule is plain.

Soviet architect I.B. Zholtovsky made the analysis of architectural monuments of ancient Greece and the Italian Renaissance. He found that there is another ratio, closely related to the golden ratio, is widely used in architecture. With its unit interval is divided into parts 0.528: 0.472.

Using proportions, axial symmetry, for centuries people tried to unite and create order, beauty and perfection of one of them, to create a masterpiece of creativity of the Kazakh people, a yurt. Manifestation of the laws of the golden ratio used in the architecture of the Kazakh yurt. The main insulation material is felt, which has a great ability to keep warmth. Kazakh yurt called Kiisa ui. It consists of two parts: the roof-shaped tapered hemispherical lower part in the form of a cylinder with a diameter of six feet and a height of about three meters yurt.

Thus, in the process of adaptation to the environment, creating artistic and cultural community of residence, nomads brought into the world a masterpiece of world civilization - Kazakh yurt. On the yurt was linked whole life Kazakhs, so she had a special place in the life of everyday. Yurt adapted to the nomadic life and a very effective tool in the process of nomadism, meets all the requirements of the nomadic way of life: mobility, can be easily disassembled and quickly installed to a new location. Yurt is striking in its perfection. For thousands of years all components carefully honed until they reached the ideal. The great French architect Le Corbusier admired completeness, versatility, interchangeability of parts of the yurt. That's it; he is regarded as one of the prototypes of his concept of "House - a machine for living". Simple manufacturing technology, it is very convenient and practical to use, the yurt is a socio-cultural and technologically organized model of the universe is not only a nomad in their Ethno ecological understanding, but also social and cultural terms. The main purpose of semantic yurt was to ensure the health, fertility, growth and well-being of its inhabitants.

The form of the home, part of it, facing in all directions; material from which built a house, texture, colour, quality components that make up the tent, all this is connected with the notion of ideological architecture – the keeper of family well-being of ancient Kazakhs.

$$S_{cylinder} = 53,78 \text{ m}^2, S_{lateral cone} = 53,18 \text{ m}^2, S_{lateral cone} = 53,18 \text{ m}^2, S_{s} = 106,96 \text{ m}^2, V_{cylinder} = 69,88 \text{ m}^3, V_{cone} = 15,16 \text{ m}^3, V_{cone} = 85,04 \text{ m}^3$$

In architecture, there is a formula that allows you to make an assessment of the home [3]:

Where K – isoperimetric ratio of comfort, V – volume of the dwelling, S – total surface area. Substituting the numerical values in formula, one can calculate the K value:



Fig. 2

 $K = \frac{36\pi V^2}{S^2}$ where K – isoperimetric co-

efficient of comfort, V- the volume of the dwelling, S- the area of a full surface. Having substituted numerical data in a formula, it is possible to calculate value to K:

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 $K = \frac{36 * 3.14 * (85.04)^2}{(106.96)^3} = \frac{817534,76}{1223669,63} \approx 0,668$

Comparing coefficients of comfort of different types of the dwelling, we will fill in the table:

p/n	Type of dwelling	Isoperimetric coefficient of dwelling comfort
1	East-Siberian chum	0,356
2	Our usual abode	0,441
3	Dwelling of Cameroon people Kirdi	0,632
4	Kazakh's yurt	0,668

As a result, we conclude that of all kinds of home comfort yurt isoperimetric ratio is close to unity and hence yurt – the most acceptable and convenient form of housing.

It is called the coefficient of comfortable dwelling, now K value is equal to 1, and this is possible only for a sphere, and the coefficient does not depend on its radius. The larger K is, the larger cubic capacity can be obtained per unit area.

Elements of mathematical concepts were widely used among the Kazakhs in the social cultural life, in everyday life.

Analysis of the Kazakh national patterns from a geometric point of view, demonstrates in them parallel transport, central, axial, rotary and sliding symmetry. A man in his practical life using geometric concepts – symmetry in the construction of dwellings in the creation of everyday objects in the decoration of clothes, distribution of wood carving and embroidery. Many products are rich in patterns that are created with the help of symmetry [4].

Humanization of learning requires communication of mathematics teaching with cultural traditions and spiritual creativity of the people, use in teaching the elements of national culture, which have a mathematical basis. Pressure Western culture voluntary and involuntary pushes local culture and thus it dramatically affects the efficiency of education of schoolchildren and young people in general. Therefore, in the teaching of mathematics in school should be taken into account national and cultural peculiarities of the people. In our opinion, in the education world, spiritual culture is very useful to acquaint students with the "numerical mystics." In the Kazakh people of 3, 7, 9, 30, 41 considered "sacred" (κasietti). The number "3" means the unity and integrity of the three zhuzes (senior, middle and junior); "7" – meaning "Seven treasures" (Zheti Kazyna); "41" – one of the forty-one saint [5]. With this number is related another tradition. When, after the birth of the child takes place forty days, bathe him, pouring in 41 bowl a spoonful of water, etc. It is generally accepted among the Turkic peoples believe that God created the four elements – fire, earth, water and air.

Pythagoras wrote that "the number of rule the world." He saw: "1" – like fire, "2" – earth, "3" – water, "4" – the air.

Even numbers 2, 4, 6, 8 ... – considered female numbers 3, 5, 7 ... – male.

Different people are mystical numbers 3, 7, 9, 12, 13, 40, 666 etc. For example, Indians 666 – considered the number of the devil, Satan.

This familiarization of students with the elements of mathematics are useful in cognitive terms and convinces them that studied in school and included in the school curriculum rules, theorems derived from knowledge of the world, tested in practice and are not given as a finished product.

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Materials of Conferences

A COMBINED NUCLEAR-THERMONUCLEAR HYBRID POWER PLANT

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The combined nuclear-thermonuclear hybrid generator of neutrons impulses with use of optimization of magnetic pinch for a source of fusion neutrons is offered. Thus, it is probable, to assume hypothetically that optimization of thermonuclear microexplosion with pinch discharge use allows to be advanced to the problem decision on combined ignition of nuclear-thermonuclear hybrid reaction.

In article [1] the capability of a transmission of energy on a long distance compatible to railway transport electrification is noted. Besides, also consideration of a transmission of energy on a long distance by transmission on superconducting cables that is electrification of transportation of energy on high-temperature superconductors, and which supplement results of article [1] is possible.

At high value of an effective electric current, there usual open lines of a high electric power transport are inefficient. Therefore, it is the reason to use a high-temperature superconductor for a high transmission of energy. Also the inefficiency to above appears and at high levels of effective electric voltage [2]. Besides, also consideration of a transmission of energy at a long distance, with materials of high electric insulation properties, compatible to electrification of transportation of energy by transmission on superconducting cables, is most probably.

The corresponding line of transfer of the electric power on the lowered frequency should be considered as a frequency drop insertion that is electric power connection between usual industrial networks of an electrical supply. For example, the result of unification frequency for a transmitted alternating current is accepting expedient choice of similar value is equal to 10 Hz [1].

Global electric connection between local industrial networks allows to lower non-uniformity of the electrical supply connected with diurnal oscillations in power consumption. It is expedient to use the future with combined nuclearthermonuclear hybrid power plants for a feeding this low- frequency connection of power. One of possible directions in creation of thermonuclear reaction is the magnetically-inertial nuclear fusion [3], which is using sharpening impulse for electric current of target plasma flow. It can be applied in magnetically-inertial fusion generator of neutrons for nuclear-thermonuclear power plant with combination hybrid of nuclear fusion and nuclear fission.

So, it is necessary to give particular attention, symmetry of a design target devices of a capsule which can consist of a mix beryllides with tritium, deuterium and hydrogen, the covered shell from beryllium [4]. Also it is necessary to consider, probably, nuclear fusion reactions connected with beryllium, being in a capsule, and possible influences of impurities [5] with the electric charges.

 $P + 9Be \rightarrow 2 4He + d; p + 9Be \rightarrow 6Li + 4He,$

where 9Be-9Beryllium nucleus, 6Li-6Lithium nucleus, 4He-4Helium nucleus, d-deuteron, p-proton.

Hybrid ignition of an impulse of combined nuclear-thermonuclear reaction concerns to nuclear fusion reaction and reaction of nuclear fission in the reactor of an impulse of nuclear fission of periodic action; it should execute function of the generator of additional quantity of the neutrons.

Therefore between thermonuclear generator of neutrons and controlled nuclear energy reactor of a combined power reactor there is an additional frequency amplifier of a neutron impulses flow. It means that at high gain in this neutrons flows amplifier, the requirement to electric current value in thermonuclear generator for combined ignition of nuclear-thermonuclear reaction can be limited. The target which is used, with the form reminds "Y – pinch", it is conic twospiral [2] plasma pinch. Hypothetically, it is possible to assume use of the pulsed power generator for thermonuclear part of a hybrid power reactor with value of nominal current ≤ 17 MA (at the maximum current ≈ 20 MA).

At this current there can be no an ignition of independent thermonuclear reaction (owing to its inefficiency), however there can be a combined ignition of a hybrid of thermonuclear fusion reaction at the thermonuclear generator of neutrons and nuclear fission reaction at a nuclear impulse amplifier of the neutron flow (owing to presence of power amplifying). Impulses of a flow of the nuclear fusion neutrons, which are following with frequency, for example, $\approx 1/50$ Hz, would make supervising of the neutron flow amplifier impulse with some impulses duration ratio integer N \geq 1, or with respective frequency of impulses of nuclear neutrons $\approx N/50$ in the amplifier of a neutron flow.

The possible expected quantity of neutrons $\geq 10^{17}$ of the amplifier flows with frequency 1/50 Hz.

It is probable; it has to be used technologies of cleaning of beryllium for power losses reducing in the thermonuclear generator of neutrons which are increased because of impurities of atoms with the electric charges in thermonuclear plasma. So, it is possible to assume hypothetically that optimization of thermonuclear microexplosion with pinch discharge use allows to be advanced to the solution of a problem on combined ignition of nuclear-thermonuclear hybrid reaction.

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THE METHODOLOGY AND FINDINGS OF STRESS STATE OF THE STRUCTURAL ELEMENTS SUPPORTING BLOCKS ON THE FIXED OFFSHORE PLATFORMS

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The paper deals with a methodology for assessing the state of stress of structural components support block fixed offshore platforms. On the basis of known formulas of structural mechanics analyzed stress state columns of horizontal zones, braces, and other elements of the bearing block fixed offshore platforms. The analysis revealed that the maximum stress experienced columns and struts. On the basis of the analysis made by the author, it was found that the fatigue life of the bearing block columns is about 20 years old, braces for about 25 years, and more horizontal elements 30. The author goes on an experimental study of fatigue life of elements supporting block of fixed offshore platform, the results of which will be published later.

Keywords: stress, offshore fixed platforms, pipe, fatique limit, life cycle, wave and wind loads, equivalent stress, zero elements, support block

Most of the support block of FOPs are in the complex stress conditions and often subjected to the combined action of bending, stretching, compression and torsion. Therefore, the assessment of the actual state of stress, taking into account the mutual influence of elements is complex and time-consuming task, effective solution which can be found by constructing computer model in the software package StructureCAD [1–5].

The study authors analyzed eight inspection reports of this type of platforms located on the continental shelf of the Black Sea, which clearly indicated that the greatest damage to the platform found in the zone of variable wetting located on (below) to 10 meters above sea level, and (above) 14 meters above sea level. This area is recognized as officially considering possible once in 100 years of extreme wave height of 13,9 m (1982 storm.). Yet in fact, it show that the authors of calculations "snip loads and impact on hydraulic structures", the wave height directly causes fatigue failure does not exceed 6,3 meters. And only the impact of extreme winds at a speed of more than 49 m/s can cause a wave height of 13,9 m. The author of an analytical study which showed that elements of the underwater part of the platform are large voltage value due to weight characteristics as a platform and a bending and torque

from the wind and wave loads(WWL). In the absence of these voltage WWL loads are static and act FOPs columns along their axes. If the column is schematically considered as a beam clamped to one and one cantilevered end we can see that the maximum value of the order of 173 MPa occur at the point of load application conditional, and in point of attachment to the soil columns equal to about 250 MPa [1–5].

From this it follows that the maximum total stress value of the static and dynamic loads will be achieved as fixing portions to the ground, and in the immediate wave load application point. However, this is true only for columns. For the horizontal elements of the maximum stresses occur due to wave action, ice, and other dynamic loads, which reach their maximum values in the zone of alternating wetting. Dynamic loads in addition to them is redistributed from the load weight of the structure. Therefore, the greatest area of tension for braces can be identified only as a result of calculation.

To study the stress state of the reference block of FOPs is necessary to define the parameters of the wind, as the parameters of wave action (wave length, its height and period) are depending on wind speeds. Using official reference books, it was found that in the area of the Platform for Action of the wind, which can be classified according to speed:

Ta	ble	1

Wind speed	The average value of the total hours given wind speed per year	The duration of one cycle, in hours	The number of cycles per year
10	1155	21	55
15	1040	20	52
20	153	17	9
25	36	12	3

Characteristics of wind action in the vicinity of the installation of FOPs

Elements of the waves		Wind direction, rumba						
	W	SW	Yew	SE	The	C-B	С	NW
\overline{h}, M	5,2	6,3	6,3	6,3	4,8	2,8	2,3	2,9
$h_{1\%}, M$	11,7	13,8	13,9	13,8	10,8	6,5	5,3	6,8
τ, s	7,6	8,5	8,3	8,4	7,3	5,2	4,7	5,5
$\overline{\lambda}, M$	88	108	105	107	81	42	34	45

Features wave on Subottinskom field according to the project

In addition to these values are also possible extreme values of wind speed causing wave effect, with different values of security that leads to an increase of wave height, and hence the magnitude of the wave loads. As an example, the parameters of the waves Subbotinskogo oil and gas field, with a maximum wind speed of 49m/s:

Analyze the factors causing stress state support block. All elements of the reference block can be divided into columns, the horizontal members and braces. If we analyze the supporting columns, in the absence of wave action considerable stresses are created in these racks it by gravity of their own weight, the weight of the equipment, marine fouling and other weight factors. It should take into account the specific feature characteristic of all hydraulic structures, namely buoyancy to the elements, immersed in an aqueous environment.

As we know from the course materials resistance, the state of stress of these elements subjected to compression or tension, is calculated as follows:

$$\sigma_p = -\frac{P}{F},\tag{1}$$

where $\sigma_p - the compressive stress$, P - the longitudinal compressive force (gravitational force of its own weight columns, weight equipment, and other marine fouling. weighting factors), F - cross-sectional area of the pipe, which is calculated by the formula:

$$F = \pi \frac{\left(D^2 - d^2\right)}{4},\tag{2}$$

where D – outer diameter of the pipe, d – the inner pipe diameter.

In addition to compressive forces resulting from the forces of gravity on the structural elements of the FOP in the horizontal direction are different loads (wave, wind, etc.), the amount of which is denoted q. Note that in accordance with SNIP "Loads and effects on hydraulic structures" for the vertical elements may submit a wave as a concentrated force load with a specific coordinate, measured from the surface of the sea, or as unevenly distributed load.

Table 2

Consider a beam AB, is rigidly fixed on the one hand and on the other hand pivotally (analog column FOP reference block). On ABare uniformly distributed load q and longitudinal compressive force P.

Assume that the deflection of the beam relative to the size of the cross section can be ignored, then with a sufficient degree of accuracy in practice it can be assumed that after the longitudinal deformation force P will cause axial compression of a beam. Using the method of addition of forces, we can find the normal stress at any point of each cross section of the beam as the algebraic sum of the voltages induced by the load P and q.

The greatest tension is in the upper section fibers, where both types of deformation cause contraction; in the lower fibers may be either compressive or tensile, depending on the numerical values of voltages σ_p and σ_q . Since the voltage of the power P in all sections are identical and evenly distributed, the dangerous fibers are the most strained by bending. These are the extreme fiber section with the greatest bending moment. For them, according to, the maximum stress from bending and compression is calculated as follows:

$$\left|\sigma_{\max}\right| = \left|\sigma_{1}\right| = \left|\frac{P}{F} + \frac{M_{\max}}{W}\right|,\tag{3}$$

where W – axial section modulus of the pipe.

Let us consider to horizontal zones. Calculations have shown that horizontal belt loaded in most cases considerably less than the column and bracing. And only in the zone of variable wetting magnitude of these stresses reach their maximum values close to the values of maximum stress in the columns and diagonals. Scheme loads elements arranged horizontally is also changed. In the absence of wind and wave loads, weight loads will no longer play so important in the formation of the state of stress in the case of an element with a column or brace. Thus, from the column depending on the direction of the beam may be formed as a wave twisting and bending moments, which in some cases can act simultaneously. Horizontal belt in the areas of attachment to the columns on both sides are fixed rigidly – welding.

The formula for determining the value of the rated voltage of the bending moment in this case, will have the form:

$$\sigma_0 = \sigma_z + \sigma_x + \sigma_y = \frac{P}{F} + \frac{M_x}{I_x} \cdot y \pm \frac{M_y}{I_y} \cdot x, \quad (4)$$

Where M_x , M_y – components of the bending moment, $\frac{H}{m^2}$, x, $y - M_x$ vector does not change its direction.

 $I_x = I_y$ – moments of inertia of the crosssectional

In this case, $x = y = r_{outer}$, where r_{outer} – the radius of a horizontal cross wall member having an outer diameter D, mm.

The analysis showed that all the forces and loads acting on the bracing support block in many ways similar load horizontal elements, except for the presence in them of significant longitudinal forces due to the forces of gravity. Therefore, the previously described methods for the evaluation of the stress state of the columns and horizontal elements are similar to methods for assessing the state of stress braces.

It is important to stress the issue of assessing the state of the platform. According to the author, it is advisable to solve this problem by means of modern theories of strength to help you find the value "equivalent" voltage. To solve this problem we allocate about a point of the component of the reference parallelepiped block with edges infinitesimal length. On the faces of the elementary parallelepiped in general can act normal and shear stresses. The set of voltages at various sites, passing through the point is called a strained state of the material at the point. It is proved that you can be placed in a box space that it faces will be only normal stresses. These faces are called the major sites, and stress to them the principal stresses. The greatest principal stress σ_1 is designated, the smallest $-\sigma_3$, and intermediate – σ_2 .

After finding the values of the invariants of the stress tensor and the solution of a cubic equation with subsequent determination of the values of the principal stresses can be obtained according to the fourth equivalent stress theory of strength by the formula:

$$\sigma_{eq} = \frac{1}{\sqrt{2}} \sqrt{(\sigma_1 - \sigma_2)^2 + (\sigma_2 - \sigma_3)^2 + (\sigma_3 - \sigma_1)^2}.$$
 (5)

Table 3

The values of equivalent stress elements supporting block at various combinations of loading and different design solutions

Load		Non-sections of the support unit to FOPs													
combina-	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
tion					Т	The val	ues of e	quival	ent stre	ss, MP	a				
		(Column	S			Hor	izontal	Belt]	Bracing	3	
K ₁	45	43	18	32	51	6	7	32	17	20	77	50	104	112	114
K,	169	168	65	91	89	35	48	82	119	27	209	198	267	344	290
K ₃	250	242	115	197	173	71	75	92	250	182	208	186	206	196	320
-	Th	e value	es of eq	uivaler	nt stress	s in the	case of	f 1 (no	braces	and ho	rizonta	l belt),	MPa		
K ₁	158	159	310	367	508	—	-	—	—	—	—	—	—	—	—
К,	294	464	1092	1416	1573	-	-	-	_	_	-	-	-	-	-
K ₃	2147	1283	1722	2673	2314	_	-	_	_	_	_	_	_	_	_
-			The va	alues of	fequiva	alent st	resses	Case 2	(no bra	ces on	ly), MF	Pa			
K ₁	273	247	243	365	409	11	275	261	266	16	—	—	_	_	_
К,	1213	901	972	1213	1345	93	448	312	358	2	-	_	-	-	-
K ₃	1771	1361		2141	1954	290	2666	2658	2294	82	-	-	-	-	-
			1375												
	The	e value	s of equ	livalen	t stress	for the	e case 3	(missi	ng only	the ho	prizonta	al belt),	MPa		
К	72	55	26	30	90	_	_	_	_	-	79	32	75	127	51
К2	313	275	138	143	186				_	_	287	252	229	392	28
K ₃	450	405	203	211	123		_	_	_	_	235	23	306	256	60

Consider the stress state of the bearing block fixed offshore platforms for example, SMEs, installed on Subottinskom field. The practice of design and operation of these platforms show that the inclusion of interference of various elements of the platform is an extremely difficult task. For the analysis of the stress state of the platform it was built a computer model in the software package StructureCAD. An analysis of the state of stress is more convenient to hold, calculate the values of equivalent stresses for each element. To evaluate the stresses arising in the elements of the platform model was loaded with loads affecting its fatigue failure, it were asked: the load of its own weight, the weight of the equipment and marine fouling, buoyancy aquatic environment (a combination of loads to K_1) and the load from the wind -wave exposure. Moreover, to account for interference elements, the direction of the wind and wave load set as the Xaxis (the combination of loads to K_2), and in direction at an angle of 45° to the axis X (the combination of loads to K₃). The magnitude of the wave load was chosen corresponding wave action 1% security. Structurally, the platform is a truss structure of pipes, and has five sections, each of which height is approximately ten meters. And an additional section located above the discharge area at a height of about 6 meters above sea level and is of considerable interest for the study of the processes of fatigue failure. The study produced the following results (Table 3). Analysis of the columns supporting the FOP block indicates that the maximum equivalent stress (ES), resulting in the columns of the bottom sections (section № 1) an outer diameter of 720 mm and a wall thickness of 20 mm, appear at the impact of wind and wave loads at an angle of 45 degrees and is 250 MPa. This proves the fact that the tension in the column are not only on the factors of weight, but also on the wind and wave action, as a result of which there are significant bending and torsional moments. In the second section of the maximum stress also occurs when wind and wave loads at an angle of 45 degrees and slightly differing from the bottom and is 242 MPa, and in the absence of wind and wave loading 43 MPa. The following third section, the maximum voltage occurs under the same conditions as the first two sections, but is already significantly smaller amount of 115 MPa. In the absence of the impact of the magnitude of the voltage is only 18 MPa. Such a voltage drop is caused by the fact that in this zone is significantly redistributed weight load on the struts. Next to the columns in the zone of alternating wetting, increasing the value of the maximum

equivalent stress, which is associated with a structural feature of the platform and the project caused a decrease in cross-sectional area as a result of the use of pipes with wall thickness less than 25%, as well as higher values of wind-wave load in this area. In the area of influence of the atmospheric wave action is reduced slightly, but the action of bending and twisting moments do not stop, and the maximum value of ES is 173 MPa. And in the absence of the value of wind and wave ES reaches 51 MPa. This increase in value is due to the design of the ES platforms and due to the fact that this element of the column is not inclined, like the previous ones, and the vertical. Besides that, this section there are no braces. Analysis of horizontal zones (HZ) farms, made of pipes with diameters 420 mm and a wall thickness of 12 mm, has shown that the minimum voltage at wind and wave loads condition of 75 MPa is reached in the HZ situated in the bottom zone. Then, in the second zone, there is a slight increase in the amount of equivalent stress. In the third zone, with an increase of wind and wave loads, 22% stress value increases, the maximum values of ES reaches 92 MPa. Structurally and at atmospheric splash zones horizontal members 325 are made of tubes with diameter 12 mm wall thickness, which reduces the cross-sectional area. However, in these zones wave load reaches its maximum value, so values of stresses in these zones do not differ from the third zone. Let us analyze ES arising brace. In the absence of WWL ES values in braces significantly exceed those values in the columns and horizontal elements. This suggests that the effect of the combination weight loads significantly redistributed with columns and diagonals on the HZ. The maximum values of ES achieved with the combination K_2 , preserving the value of the order of 200 MPa, and gradually increasing with the increasing activities of WWL, reaching its maximum in the zone of splash, and then greatly reduced in the atmospheric zone.

Considerable practical interest is a study on SOP support block so-called "zero" elements, i.e, unloaded items [1–5]. The calculation of equivalent stress values for the two cases: 1) no support block braces and horizontal elements; 2) in the reference block is not only bracing; 3) in the reference block is not only horizontal belt. Develop appropriate given the three cases computer models and calculations of maximum values of equivalent stress. If you create a platform composed exclusively of the columns, in the absence of WWL stresses occurring in them, will not exceed the allowable stress for steel 17G1S from which the column equal to 252 MPa. However, with WWL for combinations of loading K_2 and K_3 voltage values significantly exceed the allowable stress. For the case \dot{N}_{2} , wherein the columns are connected by horizontal belts, the first and second sections of the columns occurs even slight increase in the values ES, due to additional torque. In the third, fourth and fifth sections of a reduction in the value of ES. This voltage in horizontal zones platform under WWL significantly exceed the level of allowable stresses. The situation greatly changes the introduction of braces, which redistribute a significant part of the load and reduce the operating voltage to almost the allowable stress level, even in the absence of horizontal belts. Thus, we can conclude that the diagonals are playing an increasingly important role in reducing the

stress state of the platform than the horizontal elements.

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FUNDAMENTALS OF THE THEORY AND PRACTICE OF THE ORIGIN AND SPREAD FATIGUE CRACKS FOR OFFSHORE OIL AND GAS INSTALLATIONS

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It was made the analysis of the contemporary theories of the origin and spread of fatigue cracks. Result of this analysis showed that, there is no theory for offshore oil and gas installations, which would allow to objectively describe the nature of this phenomenon and give analytical dependence of influence of various factors on the parameters of spread of fatigue cracks in offshore conditions. The existing studies establish a link between the number of cycles of the wave load and the maximum permissible stress. The author aims to systematize the impact, affecting the development of fatigue cracks offshore oil and gas installations, and to give a conclusion on the degree of their influence on the study process of fatigue crack formation. Based on the analysis of experience of exploitation of the structures, located on the shelf of the Black sea, the author concludes that, in addition to force influence on the process of the development of fatigue cracks influence. As a result the conclusion is made about the fact, which of the following effects plays a key role in the processes of crack formation in the offshore oil and gas facilities in various zones (surface, underwater and in the areas of periodic wetting).

Keywords: fatigue cracks, offshore oil and gas structures, thermal effects, vibration impacts, corrosion effects, variable stress

Continuous operation of steel offshore oil and gas constructions leads to the necessity of introduction of the fatigue criteria. Fatigue cracks, that formed on the different areas of the offshore oil and gas structures, represent quite serious danger and may lead to the destroy of the construction in particular conditions. Furthermore, fatigue cracks may break vacuum rating of the structure, entail the leakiness with the further submersion, that, probably, took place in the accident with "Kolskaya" platform. The basis mechanism, caused the development of the fatigue cracks, is the influence of the fluctuating loads and impacts. As it was shown in a work [1], there is a principal difference between the term "load" and "impact". In the author's opinion, if some attention was give for the questions of loads' influences, which caused the alternating stresses, and, therefore, for the development of the fatigue cracks, then for the questions of "influence of the impacts", which also makes different alternating stresses, there was lack of attention. At the present time, there is no method for offshore oil and gas constructions, which allows substantively describe the nature of these impacts and gives the numerical analytic dependences of influence of these impacts on the parameters of the fatigue cracks' initiation and development. The few studies of native and foreign authors, who were searching those questions, are dispersed in various fields of science, and the decisions, given them, cannot be easily adopted for the offshore oil and gas constructions [2, 3]. That's why author aims to systemize the impacts, which are influence on the development of the fatigue cracks of the offshore constructions, and to develop the mathematical tool, which allows

to definite the concrete numerical value of the alternating stresses, caused by these influences, and give the conclusion about the degree of their impact on the investigating process of the fatigue failures. Statistical data on the conditions of operation of offshore oil and gas constructions allow to distinguish three types of key influences affecting the development of fatigue cracks – corrosion, vibration and temperature. Let us examine them in more detail.

Corrosion impact. As it is known, immersion of metal in a liquid may lead to formation of cracks in it, even at zero voltage. Aggressive sea water environment, which is typical operating conditions for offshore oil and gas structures, corrodes metal. Stress, caused by various loads, leads to corrosive cracking. As shown the analyzes of "Shelf " institute materials for the diagnosis of fixed offshore platforms, which was made with participation of the author, structural elements found in the same areas (atmosphere, underwater and alternating wetting) have the varying degrees of corrosion damage. In the atmospheric zone there is a different degree of wear and corrosion kinds of corrosive damage. This is due to the fact that the corrosion rate is affected by the state and chemical composition of the material of construction, the intensity of solar radiation, the season, the temperature of air and water, humidity and other factors. Conducted structural analysis of the elements of the topsides showed that the average corrosion wear upper truss chords platform MSP-4 (Marine Stationary Platform), which is in operation for more than 30 years, is 10.8%, lower apron -14,6%, for cross-stay -10% and bracing struts 9%. On the Marine Stationary Platform

MSP-5, which is in operation for more than 20 years and has established in the same area, corrosive wear of the elements of the topsides higher (average 18,9%) than in the platform, noticed above. This example supports the assertion that the intensity of corrosion damage depends on many factors. The maximum values of corrosion wear make up 25-40%. The average rate of corrosion elements topsides is in the range 0,04-0,13 mm / yr. Assessing the degree of damage to steel production support blocks of MSPs, it should be noted that all the elements of platforms were affected by corrosion, but the intensity of the corrosion process depends on the positions of the elements, of their design and workmanship. Fatigue cracks and stress corrosion cracking are observed for MSPs structures in general presence of a solid and pitting corrosion

The actual state of the upper works metal parts of the manufacturing units in the variable wetting zone is characterized by significant corrosion wear, defects in welding joints, bundles of pipe material and significant cracks. Average wear in this area ranges from 25 to 40%. Maximum deterioration of the individual elements reaches 75-85%. The average corrosion rate according to data, obtained in the survey process, is 0,15–0,35 mm / year. In 2008 the Norwegian community DET NORSKE VERITAS was developed a standard DNV-RP-C103 [1–10], which contains fatigue analysis of corrosion for the various elements of the offshore oil and gas installations. Document [1-10] is based on experiments, which were made under laboratory conditions, with some fatigue test specimens until at least the destruction takes place. A significant disadvantage of these tests, as the practice showed, was static stresses while in practice during the operating of the offshore oil and gas constructions there is a constant redistribution of stresses that have a significant impact on the development dynamic of the cracks. Moreover, it was seen the correlation of stresses generated by wave loading and corrosion. the authors of the normative document were not considered, all other loads and impacts, affecting the fatigue life of structural elements of the offshore oil and gas structures. On the basis of the carried out tests the authors of the normative document built the so-called S-N curves, which relate the number of cycles of the wave loads with maximum size of the stresses acting on sections of the structural elements of the offshore oil and gas structures above which the characteristics of the fatigue cracks become critical . These studies were conducted with the corrosive conditions in the fully immersed in water and the sample element in the air. Also takes into account the influence of cathodic protection systems on the

rate of crack propagation and growth to its critical value. These data suggest that for the same number of cycles of the wave loads on offshore oil and gas installations in the presence of cathodic protection systems, greatly reducing the intensity of corrosion processes, the maximum voltage is significantly higher than that in the absence of such protective systems. This once again confirms the conclusion that the corrosive effect has a significant influence on the development of fatigue cracks in the offshore oil and gas structures. One of the most important effects, affecting the fatigue failure, is vibration impact. In the operation of offshore oil and gas installations under the action of different loads, especially wind and wave experiencing cyclical fluctuations voltages having different origins and frequency. The sources of vibration on offshore facilities are: vibration of the mechanical equipment, the resonance vibration of the wave loads, slowly changing forces caused by waves and wind, tidal phenomena. One of the most important mechanisms, that cause vibration, is the formation and breakdown of vortices from the surface of the component of offshore oil and gas installations that occur when is the steady hydrodynamic flow or wind flow [1]. Under the effect of these fluctuations is cyclical change in the position of sections of structural elements of the offshore oil and gas structures on their initial position. The vibration amplitude varies from zero to a maximum value with different frequence, causing the change magnitude and direction of the stresses in the cross sections of structural elements of the offshore oil and gas structures. The total stress caused by vibrations, characterized by two components -static and dynamic components. Static component is constant and dynamic depends on the amplitude of oscillation. Full voltage, which in the study vibration impacts will be considered as the sum of the voltage obtained from the vibration and all the other pressures and influences. Full voltage changes twice during one period of oscillation in the range of the amount of static and resonant stresses to a minimum and maximum amount of static resonant stresses. In each subsequent period, the total voltage decreases as the damping of the oscillations. In the case of resonance oscillations are not damped, and the values the minimum and maximum resonant stresses remain constant. In general we can say that in the structural elements of the offshore oil and gas structures are permanent variable resonant stresses. In case of such exposure fatigue damage accumulates in the material of the offshore oil and gas structures, that significantly reduce the strength properties of metal, and the destruction of the offshore oil and gas structures can occur when

the value is less than the maximum operating voltage [1]. Metal fatigue occurs when there are a large series of voltage changes, regardless of the material from which made the offshore construction. Even in a completely new material can be some defects. In the operation due to changes in the stress state of the element with fluctuations there is a gradual increase in these defects, change of their size and shape is of a casual nature. Therefore, the development of fatigue cracks and defects is characterized by the possible random events caused by the probabilistic nature of the fatigue. Probabilistic or random nature of fatigue destruction makes it impossible to accurately calculate the time when the fatigue failure of the variables resonant stresses will come. By now, it has been developed several theories, which allow making a determination of the time when the fatigue damage, caused by variables vibratory stresses, onset. The most significant among these methods is the method of testing samples of material or directly structural elements of the offshore oil and gas installations, determining the number of cycles of alternating resonant stresses up to direct their destruction. When considering the fatigue phenomena, outside of these studies is the study of the influence of the variables of temperature fields. Therefore, the author aims to assess the impact of the variables of the *temperature effects* on the development of one of the most dangerous defects of the offshore oil and gas structures fatigue cracks. Let's analyze the challenge of influence of the temperature fields in details. According to the authors' opinion, it is reasonable to mark 3 rates of temperature influence's zones: 1) subsea; 2) atmospheric; 3) zone of cyclic wetting. Subsea zone is characterized by nonhomogeneous temperature field, which is determined by different streams. Temperatures in the subsea deepwater zones are plus degrees. With a decrease in the depth, the temperature regime in the area of underwater largely depends on the ambient temperature. For example, in the area of Subbotinskoe deposit in the Black Sea there are the strongest temperature variations recorded at a depth of 50 meters, but below this mark of temperature changes do not take place. Since the depth zone of 50 meters, the temperature does not change and is within 8 degrees Celsius. And up to a depth of 1500 meters the temperature is in the range of about 9 degrees Celsius. This indicates that with increasing of the depth influence of the variables thermal stresses on the development of fatigue damage decreases. Temperature of the sea at a depth of 30 m is determined primarily by atmospheric temperature factor. Gradually with increase of the depth of 50 meters the effect of this factor decreases and approaches a

constant temperature of around 9 degrees Celsius. Atmospheric zone is characterized by fluctuation of temperature from $-65 \degree C$ to $+5...+10 \degree C$ for Nordic fields and to + 5...+ 10 °C for Nordic fields and from + 10 °C to + 60 °C for the fields in the Persian Gulf region. It should also be noted that despite the fact that the temperature of air in the area of Subbotinskoe field rarely heated over 40°C, the structural elements of the offshore constructions (as shown conducted directly by the author in the field of measurement) under the influence of solar radiation at peak solar activity is heated to + 80 °C or more. During the night hours of the temperature of the structural elements the offshore constructions dropped to 20 °C ... 25 °C. These data suggest that twice during the day drop of the temperature of structural elements of the offshore structures can reach $\Delta T = 40 \,^{\circ}\text{C}$, that causes, according to preliminary calculations, conducted by the author, a variable voltage , which can reach values approximately 70 $N\!/$ mm2 (calculations were carried out for the element of bearing block of the offshore stationary platform on the Subbotinskoe, which is made of steel VST3SP5 and has a cylindrical shape with a diameter of 1220 mm and a wall thickness of 12 mm). Theoretically, the most unfavorable from the point of view of kinetic effects of temperature fields is periodic wetting zone, as it is within range of ambient temperature field and the temperature field of the oncoming wave flows characterized by a high frequency. However, as it was shown by the measurements, led by the author in the area of Subbotinskoe field, the temperature fields of the sea water and the air in the range-10 m < G.V. < 15 m (GV - water horizon) particularly are not differ from each other. This is probably due to the predominant influence of the temperature of the atmosphere at the temperature of the sea water at depths up to 30 m Therefore, the assumption that the zone of alternating wet from the point of view of the impact of the variables of temperature fields is the most unfavorable for the formation of fatigue cracks, at least in terms of Subbotinskoe field, according to the author, can be considered erroneous. Perhaps this assumption may not be true under conditions of strong vertical currents rising from the depth of the water body having a lower than in the surface layers of temperature, accompanied by excitement, however, in natural measurements, similar results were not recorded, and this assumption remains theoretical. Changing of the temperature field of environment, which is around offshore structure, leads to a change in the temperature field of marine oil and gas facilities, changing its current state of stress. The hazards of the tensile stress, which resulted cracks in a

body of structural elements of the offshore structures. can be called a thermal fatigue. Note that the tensile stresses occur at the time of lowering the temperature of structural elements of the offshore structures. The situation is somewhat exacerbated when considering offshore oil and gas pipelines, as in this situation, in addition to the listed cases there is a third temperature field by the pumped product

Typically, this field is considerably different from the ambient temperature and has a certain value due to an increase in oil viscosity and the impossibility of its transport by pipeline enlarge certain temperature or the formation of gas condensate plugs during gas pumping. Furthermore, the temperature of oil, exiting from the well, can reach 100°. Therefore the solution of the problem of the influence of variable temperature field on the reliability, safety and durability of the offshore constructions is relevant and timely. The solution of this problem is offered in terms of the classical theory of thermo-elasticity and is reduced to the following steps. The first step is to determine the temperature fields acting on sections of structural elements of the offshore structures, the method of determination described in [1-10]. The second step is to determine the relationship between the temperature field and stress, arising from its actions, according to the formulas given in [1–10]. Analytical results of numerical simulations, conducted by the author on the pipeline, made of steel 09G2S with diameter of 530 mm and a wall thickness of 25 mm, indicates that the temperature difference between the inner and outer walls of the pipeline is in all 0,5 °C, hoop stress is approximately 28 N/ mm2, and with a difference of 2°C these stresses reach values of about 140 N/mm2. Experimental measurements on the pipeline in the area of Subbotinskoe deposit showed that the outer tube wall temperature depends primarily on the temperature of the pumped product, and to a lesser extent the ambient temperature. Thus, we can say that is not currently developed theories of the origin and development of fatigue cracks in relation of the offshore constructions, and existing researches, when considering this issue, only take account of the impact of the wave, neglecting temperature and vibration effects. The author proposes a

new theory of the development of fatigue cracks of the offshore structures, which are taken into account in addition to the power impacts the corrosive, temperature and vibration effects. As a result of the study the author found that the formation of fatigue cracks temperature effects are most active in the area above water and underwater to a depth of 30 m, corrosive effects of stronger influence in the variable wetting and vibration effects contribute to the growth of fatigue cracks in the zones of maximum influence of hydrodynamic and wind flows. The author continues to carry out experimental research in the direction of fatigue cracking of the offshore structures, the results of which will be published later.

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ANALYSIS OF SYNERGIC EFFECT IN COMPOSITIONAL COATINGS WITH TAKING INTO CONSIDERATION THE SOLID COMPONENT OF THE COUNTER-BODY AND THE LIQUID LUBRICANT

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In simple case the tribologic system from two materials may be presented by following scheme M1//M2, where the symbol is denotes the "third body" without liquid lubricant. If the friction velocity V and the specific loading P are fixed, the tribologic characteristics of the M1 surface are dependent on composition and properties of the counter-body, i.e. M2. And what are the true M1 properties?

Let's assume that some friction condition (P, V, stationary regime, identity materials) are the "standard". Then the sets of $(f_i^o, I_{lin,i}^o)$ values, which were received in corresponding systems Mi//Mi, may be presented as a "conventionality values" of the antifrictional property and the firmness for wear of the Mi material, only. In this case the comparative analysis of the materials properties and the prediction of its tribologic characteristics in others systems may be accomplished. Really, for M1//M2 system the properties of the M1 and M2 surface are following:

$$\begin{array}{l} f_1 = f_1^{\circ} + (I_{\ln_1 1}^{\circ} / (I_{\ln_1 1}^{\circ} + I_{\ln_1 2}^{\circ}))(f_2^{\circ} - f_1^{\circ}); I_{\ln_1 1} = I_{\ln_1 1}^{\circ} + \\ + [(f_1^{-} f_1^{\circ}) / (f_1^{\circ} + f_2^{\circ})] I_{\ln_2 2}^{\circ}; \\ f_1 = f_1^{\circ} + (I_1^{\circ} / (I_1^{\circ} + I_2^{\circ}))(f_1^{\circ} - f_1^{\circ}); I_1 = I_1^{\circ} + \\ \end{array}$$

 $\begin{array}{l} f_{2} = f_{2}^{\circ} + (I_{lin,2}^{\circ})/(I_{lin,1}^{\circ} + I_{lin,2}^{\circ}))(f_{1}^{\circ} - f_{2}^{\circ}); I_{lin,2} = I_{lin,2}^{\circ} + \\ + [(f_{2}^{-} - f_{2}^{\circ})/(f_{1}^{\circ} + f_{2}^{\circ})]I_{lin,1}^{\circ}; \\ \text{where the } (f_{1}^{\circ}, I_{lin,0}^{\circ}) \text{ and } (f_{2}^{\circ}, I_{lin,2}^{\circ}) \text{ are the values,} \\ \text{which were received in corresponding M1//M1 and} \end{array}$

M2//M2 systems. Then we have the next correlation: $I_1 + I_2 = I_1^{\circ} + I_2^{\circ}, f_1^{\circ} = f_2^{\circ} = f = (f_1^{\circ} I_1^{\circ} + f_2^{\circ} I_2^{\circ})/(I_1 + I_2).$

Thus, in the first place, the summary wear in tribologic system is the wear sum of the system elements, which were received on "conventionality scale", and secondly, the wear-friction of tribosystem $f(I_1 + I_2)$ is the wear-frictional sum of the system elements, which may be calculated on "standard scale". By this thesis the prediction of the tribologic characteristics of materials surface in any systems Mi//Mj may be realized if the experimental dates for systems Mi//Mi and Mj//Mj are determined.

1. The velocity of linear wear I^o and the friction coefficient f^o of the compositional covers (CC) may be presented in following form:

 $I^{o} = \alpha < I^{o}_{sol} > + (1-\alpha) < I^{o}_{lub} > + \delta_{I} (< I^{o}_{sol} > -< I^{o}_{lub} >),$ $f^{o} = \alpha < f^{o}_{sol} > + (1-\alpha) < f^{o}_{lub} > -\delta_{f} (< f^{o}_{sol} > -< f^{o}_{lub} >),$ where the values $\delta_{I} = \delta_{f} = \delta = 4(1-\alpha)\alpha^{2} [1-k(1-k_{n})]$ is the relative synergic effect of the corresponding properties, the symbol α is denotes the volume share of solid CC component in two-component (solid + lubricant) approach, and the parameters k and k_n are the dimensional and nano-structural factors, accordingly [1–4].

If the values I_{CB}^{o} and f_{CB}^{o} are the counter-body (CB) tribologic properties according to "standard scale" (by conditions I_{CB}^{o} >I^o and f_{CB}^{o} >f^o), then we have

$$\begin{split} I &= \alpha' < I^{\circ}_{sol} > + (1-\alpha') < I^{\circ}_{lub} > + \delta'(< I^{\circ}_{sol} > -< I^{\circ}_{lub} >), \\ f &= \alpha' < f^{\circ}_{sol} > + (1-\alpha') < f^{\circ}_{lub} > -\delta'(< f^{\circ}_{sol} > -< f^{\circ}_{lub} >), \\ \text{where} \quad \alpha' &= \alpha + \Delta \alpha, \qquad < I^{\circ}_{sol} > = < I^{\circ}_{sol} > -\Delta I_{sol} >, \\ < f^{\circ}_{sol} > &= < f^{\circ}_{sol} > + \Delta f_{sol}. \\ \text{Taking into consideration the most possible} \end{split}$$

Taking into consideration the most possible correlations $k_{CB} \cong k \cong 0.5$; $k_{nCB} \cong k_n \cong 0$ and neglecting of members, which are contained $(\Delta \alpha)^2$ and $(\Delta \alpha)^3$, we have the next relation for relative synergic effect $\delta' \cong 2(1-\alpha)\alpha^2 - 2\alpha(3\alpha-2)\Delta\alpha = \delta - \Delta\delta$, where the value $\Delta\delta$ is the change of the synergic effect amplitude. Then the changes of the CC tribologic properties are following:

$$\begin{split} I & - I^{o} = (\Delta \alpha - \Delta \delta) (\langle I^{o}_{sol} \rangle - \langle I^{o}_{lub} \rangle) + (\alpha + \delta) \Delta I_{sol} \\ f - f^{o} = (\Delta \alpha + \Delta \delta) (\langle f^{o}_{sol} \rangle - \langle f^{o}_{lub} \rangle) + (\alpha - \delta) \Delta f_{sol} \end{split}$$

In these correlations the members contained of little values $\Delta\delta\Delta f_{sol}$, $\Delta\alpha\Delta f_{sol}$, $\Delta\delta\Delta I_{sol}$ and $\Delta\alpha\Delta I_{sol}$ were neglected.

It's determined, by fixed α the relation for $(f-f^{o})$ is increase when the $\Delta \alpha$, $(<f^{o}_{sol}>-<f^{o}_{lub}>)$ and Δf_{sol} are increase. The dependences $(I-I^{o})$ are contains maximum with coordinates $[(I-I^{o}), \alpha]_{max}$. By increasing the values $\Delta \alpha$, $(<I^{o}_{sol}>-<I^{o}_{lub}>)$, and ΔI_{sol} the coordinate $(I-I^{o})$ is increase, too, but second coordinate α_{max} is decrease.

It's note, this qualitative dates are may be used for prediction of LL substances for with necessary CC tribologic properties [5, 6].

2. In accordance with "concentration wave" model the velocity of linear wear I^o and the friction coefficient f^o of the compositional covers (CC) may be presented in following form:

 $I^{o} = \alpha < I^{o}_{sol} > + (1-\alpha) < I^{o}_{lub} > + \delta_{1} < I^{o}_{sol} > - < I^{o}_{lub} >),$ $f^{o} = \alpha < f^{o}_{sol} > + (1-\alpha) < f^{o}_{lub} > - \delta_{f} < f^{o}_{sol} > - < f^{o}_{lub} >),$ where the values $\delta_{I} = \delta_{f} = \delta = 4(1-\alpha)\alpha^{2} [1-k(1-k_{n})]$ is the relative synergic effect of the corresponding properties, the symbol α is denotes the volume share of solid CC component in two-component (solid + lubricant) approach, and the parameters k and k_n are the dimensional and nano-structural factors.

If the values $(I^{\circ}_{Llub}, f^{\circ}_{Llub})$ are the conventional characteristics of the liquid lubricant (LL) according to "conventionality scale" (by conditions $I^{\circ}_{Llub} < I^{\circ}$ and $f^{\circ}_{1lub} > f^{\circ}$), then we have

$$I = \alpha^{2} < I_{sol}^{o} > + (1 - \alpha^{2}) < I_{lub}^{o} > + \delta^{2} < (< I_{sol}^{o} > - < I_{lub}^{o} >),$$

$$f = \alpha^{2} < I_{sol}^{o} > + (1 - \alpha^{2}) < I_{lub}^{o} > - \delta^{2} < (< I_{sol}^{o} > - < I_{lub}^{o} >),$$

where: $\alpha^{2} = \alpha - \Delta \alpha$, $< I_{sol}^{o} = < I_{lub}^{o} > + \Delta I_{lub}^{o} >$, and
 $< I_{lub}^{o} > = < I_{lub}^{o} > - \Delta f_{lub}^{lub}$.

Taking into consideration the most possible correlations $k \cong 0.5$; $k_n \cong 0$ and neglecting of members, which are contained the $(\Delta \alpha)^2$ and $(\Delta \alpha)^3$ fragments, we have the next relation for relative

synergic effect $\delta' \cong 2(1-\alpha)\alpha^2 + 2\alpha(3\alpha-2)\Delta\alpha = \delta + \Delta\delta$, where the value $\Delta\delta$ is the change of the synergic effect amplitude. Then the changes of the CC properties are following:

$$\begin{split} I &-I^{o} = -(\Delta \alpha + \Delta \delta)(<I^{o}_{sol} > -<I^{o}_{lub} >) - (1 - \alpha - \delta)\Delta I_{sol}, \\ f &-f^{o} = -(\Delta \alpha - \Delta \delta)(<f^{o}_{sol} > -<f^{o}_{lub} >) - (1 - \alpha + \delta)\Delta f_{sol}. \\ It's note, that in these correlations the members \end{split}$$

It's note, that in these correlations the members contained of little values $\Delta\delta\Delta f_{sol}, \ \Delta\alpha\Delta f_{sol}, \ \Delta\delta\Delta I_{sol}$ and $\Delta\alpha\Delta I_{sol}$ were neglected.

It's determined, by fixed α the relation for (f–f°) is increase when the $\Delta \alpha$, (<f°_{sol}>–<f°_{lub}>) and Δf_{sol} are increase. The dependences (I–I°) are contains maximum with coordinates [(I–I°), α]_{max}. By increasing the values $\Delta \alpha$, (<I°_{sol}>–<I°_{lub}>), and ΔI_{sol} the coordinate (I–I°) is increase, too, but second coordinate α_{max} is decrease.

This qualitative dates are may be used for prediction of new CC with necessary tribologic properties [5, 6].

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NOTABLE ACHIEVEMENTS IN AVIATION AND AEROSPACE TECHNOLOGY

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The cost of a launch the payload into orbit at the present time is still extremely high. This is due to the high cost of the rocket engine, complex control system, expensive materials used in the construction of rocket and their engine, and mainly by their single use.

At the end of XX and beginning of the XXI centuries, the unit cost of a deliver the payload into low earth orbit for non-reusable and reusable carrier of U.S. and Western Europe is approximately 10 000 to 25 000 \$/kg. Since 1981, NASA's dream of a reusable spacecraft "Space Shuttle" was realized and has launched more than 100 missions, but the price tag of space shuttle missions has changed not much. For space transportation system "Space Shuttle", the cost of deliver payloads into low earth orbit is 10 416 \$/ kg (in 2011). Using the new generation expendable launch systems type of "Atlas V", "Delta IV" and "Ariane 5" should lead to some reduction in the unit cost of launch, but, as expected, are not too significant. Due to the peculiarities of the development of space technology in the USSR, the unit cost to deliver payload into orbit by expendable launch system of Russian are noticeably smaller. For example, the cost of a launch by "Soyuz" and "Proton" actually is 2400 and 2100 \$/kg, respectively. Nevertheless, further reducing the cost of a launch the payload into orbit associated with reusable hypersonic aircraft.

A new space transportation system being developed could make travel to geostationary earth orbit a daily event and transform the global economy. Theoretically, the most beneficial from an economic point of view, the delivery of payloads and passengers into space is the Russian idea "Space Elevator".

In 1895, the father of astronautics Konstantin Eduardovich Tsiolkovsky in one of his articles described the gigantic structure with a rope stretched to the "Heavenly Palace" where had to climb the elevator, then to fly further into space.

The future "Space Elevator" would be made of a carbon nanotubes composite ribbon anchored to an offshore sea platform would stretch to a small counterweight approximately 100 000 km (62 000 miles) into space. Mechanical lifters attached to the ribbon would then climb the ribbon, carrying cargo and humans into space, at a price of only about 220 to 880 \$/kg (100 to 400 \$/lb).

At the Department of Aeromechanics and Flight Engineering (DAFE) of Moscow Institute of Physics and Technology (MIPT) was developed the information technology projects "ADANAT" (Aerodynamic Analysis of Ensuring the Establishment of Aviation and Space Techniques) and "TURBO SEARCH" by Professor Yuri Ivanovich Khlopkov. Many research grants from the Russian Foundation for Basic Research (RFBR) and Russian Science Foundation (RSF) supported these projects. The parallel calculation center of DAFE MIPT is equipped with the modern CFD software. DAFE with the famous organizations of Russia "Central Aerohydrodynamic Institute (TsAGI), Central Institute of Aviation Motor Development (TsIAM), Dorodnicyn Computing Centre of the Russian Academy of Sciences, Institute for Problems in Mechanics of the Russian Academy of Sciences, Sukhoi Aviation Holding Company, engineering company "TESIS", etc" was defined many fundamental problems in the field of creation of new generation of aviation and space techniques. Development of the center allowed promoting in the solution of the most complex challenges of computing in aerothermodynamics problems. Some of these are the problems of hypersonic aerothermodynamics, rarefied gas dynamics and task about flows in turbojets, etc.

Under the projects the following books were published:

1. Khlopkov Yu.I., Zharov V.A., Gorelov S.L. Guidelines for Computer Analytics. Moscow, MIPT, 2000. – 118 p. (in Russian)

2. Khlopkov Yu.I., Zharov V.A., Gorelov S.L. Coherent Structures in Turbulent Boundary Layer. Moscow, MIPT, 2002. – 268 p. (in Russian)

3. Khlopkov Yu.I. Statistical Modelling in Computational Aerodynamics. Moscow, MIPT, 2006. – 158 p. (in Russian)

4. Belotserkovskii O.M., Khlopkov Yu.I. Monte-Carlo Methods in Mechanics of Fluid and Gas. Moscow, Azbuka-2000, 2008. – 330 p. (in Russian)

5. Khlopkov Yu.I., Zharov V.A., Gorelov S.L. Renormalization Group Methods for Describing Turbulent Flow of Incompressible Fluid. Moscow, MIPT, 2006. – 492 p. (in Russian)

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Historical overview of development of hypersonic and aerospace vehicles, perspective programs in aerospace programs of developed countries are presented in this book. Analysis of methods to predict aerothermodynamics characteristics of hypersonic and aerospace vehicles from orbital flight to continuum flow regime are also described. Application of cognitive approach in computational aerodynamics, in particularly, in hypersonic vehicle design technology is introduced. The basic principle of hypersonic propulsion systems: rocket engine, turbojets, ramjets, scramjets, and the dual-combustion ramjet are explained. The most beneficial system to deliver payloads and crews into space "Space Elevator", the project plans and concepts are highlighted. In the last chapter, also highlighted that we need to consider medico-bilogical effect and to improve system for the medical support of human in space due to future space exploration plans of delivery manned spacecrafts with crews to the Moon and Mars.

Future space launch systems will be designed to reduce costs and improve dependability, safety, and reliability. In the meantime most military and scientific satellites will be launched into orbit by a family of expendable launch vehicles designed for a variety of missions. Every nation has their own launch systems, and there is strong competition in the commercial launch market to develop the next generation of launch systems. Developing a plan to realize a space elevator and reusable hypersonic vehicle system are to change our approach to operations in space exploration. Low cost, safe, reliable and flexible delivery of payloads to GEO.

One of characteristic tendencies of development of aerospace technology is continuous extension of requirements to technical characteristics, functionality of aircraft. Possibility use of cognitive approach to aerospace technology is introduced. Using cognitive technology allows achieving the improvement of quality and speed of the solution of considered problems; arising at development, optimization and an assessment of parameters of aircraft, processing of results of experiments, identification of dangerous situations and in process of development, modernization of aerospace technology and applied solution of aerospace system.

The main strategy of space sciences at next step are: to continue the fundamental and applied physiological and biological research abroad international space station (ISS); space transporation systems and unmanned spacecrafts including research on international basis, to accumulate the new biomedical data related to the extra prolonged orbital manned flights and future flights of crews to the Moon and Mars; to provide the medico-engineering and ergonomic support of new manned space systems development; to improve system for the medical support of human in space. The study was supported by Russian Science Foundation.

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APPLICATION OF NON-FERROUS METALLURGY'S WASTES IN THE BINDER COMPOSITIONS AND CONCRETES FOR SPECIAL USES

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Provision of mineral materials in different sectors of domestic industry is an important problem of science and technology, as stocks of raw materials as well as replenished anthropogenic materials is necessary for normal operation of enterprises [1-6]. For example, during the process of producing nonferrous metals a great number of substances forms: slag wastes, slime of irrigated suspensions of nano- and micro-dispersed particles, dust, and the discharged gases. In order to produce construction materials and products (especially those of special purpose, in other words, designed to operate under the impact of high and low temperatures, aggressive environments, grating and hit-vibration strains, etc.). First of all, granulated slags and slimes (nepheline, bauxite, sulphate, monocalcium, etc.) have industrial significance [2]. Works, aimed to study physical-chemical, mechanical, and technological characteristics of multi-tonnage slag wastes, produced during the procession of nonferrous ore, have shown that production of construction materials can utilize slags, received from procession of copper and nickel ores that excel furnace slags in such characteristics as durability and acid resistance [1, 5]. Granulated slags are an alternative to siliceous component in production of materials of autoclave curing; their implementation is also possible in receiving heavy concretes that are dense, fine-grained, light on porous fillings, and porous [1]. Slags of nonferrous metals, processed into stone and small filling can be the most efficient way to solve problems in the area of environment preservation and utilization of wastes after the extraction of valuable components [1, 5]. Slime wastes (byproducts of processing alumina-containing material) can be used in production of cements: kaolin slime is close to Portland cement in its chemical composition, belit slime (nepheline) is used in production of highly-active cements [1, 2, 4]. Apart from cement production, nepheline slime is also utilized in production of construction bricks, blocks, plates; in road construction it is used to fortify soils of underlayer; in production of binding for asphalt-concrete, output of fire-resistant bodies, colored glass, etc. [1, 4]. Another perspective approach is discharge of independent concentrates (for example, molybdenium concentrate from copper-molybdenium ores, copper and bismuthic concentrate from tungstenmolybdenium ores, feldspar concentrate from nonferrous metals, etc.) [3]; production of fire-resistant glues from the processed chromia-alumina catalysts and phosphate bindings [5], etc. Possibility of using disperse ashes - carryovers as aliminia silicate components of alkaline bindings was studied in works of V.D. Glukhovskiy and co-authors [2, 6]. In order to construct ash-alkaline bindings on alkaline components (sodium, sodium fusion cake, liquid glass), P.V. Krivneko, R.F. Runova, E.K. Pushkareva have suggested methods that imply combined graining of ashes or ash-slag compositions with lime or metallurgical slag and Portland cement clinker; however, regardless of utilization of the prepared disperse product - carryover ashes, production of such binding solutions requires grain of component combination, and it may limit introduction of the method into production in certain cases [2].

Thus, practical significance of implementing different wastes of nonferrous metallurgy in production of construction materials of special purpose does not cause any doubt. However, due to insufficient provision of technological aspects of utilization, part of the re-processed wastes at the enterprises of nonferrous metallurgy remains small, the greatest part of wastes is drained into storages or took to the drop. From our point of view, active utilization of multi-tonnage wastes of nonferrous metallurgy is not resent in the country, as their reprocession requires special physical-chemical technologies, linked to the basic sources of forming secondary materials.

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ABOVE US ONLY SKY

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The Soviet and America relationship changes regularly from cold war to peace friendship and cooperation. There is the possibility of widely changes in different field of science and cultural. One of the popular in the changes is the Centre of international program – Youth creators of the 21st century and people to people organization from the United States.

Our film call "**Above us only sky**" is developed to one of these meetings. One of the program leaders said about the American participating to the program "we have an opportunity to feel of the wink of the soviet people, to share hospitality, to learn about cultural and history, especially, to learn about scientific matters and to share a little about America with the Soviet students, families and teachers. I hope that better understanding between our children. This is not a political program".

Some years ago, one of dream such advanced, and it have been called a reality. The group of America students visited the Moscow institute of physics and technology. One day, the children visited the Aerodynamic and flight engineering department of the institute. The dean (Khlopkov Yuri Ivanovich) told the guests the developed of the faculty and developed of two major aerospace research centers located in Zhukovsky. One of them is the Central aerodynamic institute name after Professor Nikolai Zhukovsky. Fundamental investigating and different field of aerospace science are held here. They visited the cosmonaut training center. The successful work jointed with space in 21st century is depends on them – today school program.

Not only jointed in physics classes, the study of Russian language is the children to understand one another. They spend time with some families to help and better understanding love about people.

They visited to the historical places. It is impossible to understand the background of the nation without learning their history and culture.

Unfortunately, it is time to drive their life. The great meeting, Soviet-American school of physics will present awarding the diplomas of the Moscow institute of physics and technology to all the participants. The servants of American delegation change the stage flag for their friendship. With hope such meeting will help our friendship.





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In this film presented the origins of establishing relationship between the two great nations such a thin field as science. The program is fully justified. It gave the opportunity to start a fully exchange students, including between the universities as bright as the Moscow State University, Moscow Institute of Physics and Technology and Massachusetts Institute of Technology, and the Michigan University of Aerospace Engineering. And now, after so many outstanding achievements by the former Russian students, Russian students are studying in America and American students are studying in Russia when between us this film becomes special urgency! This paper is supported by Russian Foundation for Basic Research (Project No. 14-07-00564).

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THE CRITICAL REGIMES OF FLIGHT AT HIGH ANGLE OF ATTACK (EXPERIENCE OF USE IN EDUCATION)

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The work presents scientifically-educational video film "The flight at high angles of attack". This video film is about the physical aspects and, mathematical models, wind tunnels experiments for the flights of airplanes at high angles of attack. Bright present aero physical experiments in the wind tunnels of Central Aero hydrodynamics Institute (TsA-GI), flight experiments in Flight Research Institute (LII), mathematical models elaborated with Moscow Institute of Physics and Technology (MIPT). Besides it's shown the role of this video film in the educational process of the Department of Aeromechanics and

Flight Engineering of Moscow Institute of Physics and Technology.

The work concerns the most difficult, "eternal" aerodynamic problem – the flight under critical regimes. High angles of attack lead to breakdown of flow with foil's surface, abrupt to deterioration aerodynamic characteristics, loss of a stability of a flying machine, entrance it in fail. Problem is multiplane. It is connected with a research of complicated structure of flow in laminar and turbulent boundary layer, conduction thin aero dynamical experiment, connected with nonstationarity, solution Navier-Stokes and Reynolds equations, research of a stability and control aircraft, conduction bench and flight experiment, tutoring of the pilots.

On faculty of aeromechanics and flight engineering MIPT in many chapters of teaching of aerodynamics by and large concern questions of critical regimes of flight. Already with second year, since "Introduction in aerodynamics", concerned the question of critical regimes of flight.

The educational plan of faculty of aeromechanics and flight engineering MIPT consists of institute cycle, uniform for the students of all faculties, fundamental aerospace cycle, uniform for all students of aeromechanics faculty, and base cycle, where for the students are read special courses (different for various sub-departments of a base). There are 10 base sub-departments on the faculty, placed in three scientific centers – Central Aero hydrodynamic Institute, Flight Research Institute, Central Institute of Aviation Motors. On these sub-departments are read about 100 courses.

We have ten sub-departments: Theoretical Aero hydromechanics, Flight Dynamics; Aero physical Experiment, Information Measurement Computing Systems, Flying Engineering, Durability, Systems of Automatic Planning, Flight Experiment, Force Installations, Gas Dynamics, Combustion and Heat Transfer. The main courses, which deal with the critical regimes are: Theoretical Hydrodynamics, Introduction to Turbulence, Monte-Carlo Simulation in Aerodynamics, High speed Aerodynamics, the Boundary Layer and Heat Transfer Theory, Gasdynamics, Physical Gas Dynamics, Computational Aerodynamics, Dynamics of Unstationary Viscous Fluid and Gas Flows, Wing Theory, Aerodynamics Heating and Heat Protection of Aircraft, Aircraft Aerodynamics, Power Plant of Aircraft, Wind Tunnels, Optical and Physical Investigation Methods, Aerodynamic Test Technique, Dynamics of the Aircraft Motion and Critical Flight Regimes, Aircraft Scheme Design, Aircraft Control Systems, Flutter, Structural Mechanics. The film illustrates some aspects of this course.

The maneuvering abilities of the aircraft depend a great deal on the capability of the aircraft to fly at high angles of attack. Let us remember the formulas which connect the values of the turn radius R and the turn angular velocity with values of the load factor and the air speed:

$$R = \frac{v^2}{g\sqrt{a_z^2 - 1}}, \ \Omega_t = \frac{g\sqrt{a_z^2 - 1}}{v},$$

where a_{z} – load factor.

Analyzing these mathematical relations it is possible to say that the radius of the turn will be minimum and the turn angular velocity will be maximum if the airspeed of the flight is rather small but the load factor is maximum. The maximum load factor is reached at the low speed flight if the maximum of the lift coefficient is reached.



Fig. 1. Flow separation



Fig. 2. Aircraft dynamics

Thus the using of the high angles of attack allows the aircraft to execute the maneuvers in a smaller space during a shorter time interval. For example, maneuvers called "Pugachev's Cobra" can be used as a defensive technique for the running out of the tail of attack.

The purposes of this video film: understanding of the physical fundamentals of the high angle of attack and low air speed flight aircraft aerodynamics, understanding of the physical phenomena of the post-stall and spin regimes, gaining the experience of the device information analyzing and using of the aircraft control methods for the stall-prevention and spin-recovery.

The film tells about some important questions:

1. Aerodynamics of aeroplanes at high angles of attack.

Technical sciences





Fig. 4. Dynamics of spin

This part tells about the main physical reason of the aircraft stability and control loss at high angle of attack, the phenomena deterioration of the aerodynamic characteristics, phenomena of the spin rotation.

2. Aircraft dynamics at high angles of attack.

In this part one is able to acquaint with main peculiarities of aircraft motion, stability and control.

3. Aircraft dynamics and control at post-stall and spin regimes.

The success of the mastering in the high angles of attack flights will depend on the achievements of science and technology in the field of aerodynamics, dynamics and control, which were reached due to the hard work of the scientists, researchers, engineers and test pilots of all countries in the world developing aircrafts.

The 70s gave the start to the mastering of the high angles of attack, when the numerical methods of analysis and computers came to the aerospace science. Everybody may to have copy of this video film. This work is supported by Russian Foundation for Basic Research (Project No. 14-07-00564).

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Materials of Conferences

GOTHIC STYLE IN ARCHITECTURE, ARTS AND CRAFTS

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The gothic art had been experienced in XII-XV centuries in Western Europe. A typical middle-age city appeared as an interlacement of narrow dark streets with the only main cathedral square. It is impossible toseparatethe terms "gothics" and "gothic cathedral". First gothic cathedrals appeared in Northern France and after some time they became famous all over Europe. The cathedral was not just a place to pray. It represented all the ideas about the world, consciousness and beauty. Actually, it represented God, Nature and a Human.

The interiors of gothic cathedrals impress with their vastness and complexity. The main space consists of the high central nave and the lower appendix naves. The floor is extremely simple, although there are some places covered with mosaics with sacral meaning. Everything achieved in gothic style was attained against the nature of stone. The gothic architecture is represented with denying of the texture and characteristics of stone. Famous German scientist and architect V. Worringer admits that the only way to make the form endless is to make it visuallyendless. The gothic architects reached this visual effect using the extreme vertical accents. That is why all we see is the stained movement into the sky.





The exterior and interior design of the St. Stephan's Cathedral, Austria, Vienna

Architecture



The main idea of the gothic construction is minimization of the weight on the walls due to special sharp windows. The pressure of the groin is leaned on the columns by ribs and arches and the lateral thrust is perceived by flying buttresses and counterforts. The most significant discovery of gothic architecture is a crusade rib vault. It interacted with interior system of columns and exterior system of mainstay – the counterforces.

The gothic counterforce is in fact a technical development and improvement of the Roman one.

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Architecture

The improvement is represented by making the counterforce wider in the bottom and narrower on the top. This form made the counterforce more effective.

So, as you can see, it was not a problem to neutralize the lateral nave, but it was quite a difficult challenge to neutralize the middle nave. In this case, the architects used a special arch made from wedge stone – so called buttresses. One end of the buttress was stuck into the vault and the other in the counterforce. The place where the buttress connected with the counterforce was fixed with a little tower – a pinnacle.



Architecture





	The way each criterion was reached in different kinds of art									
criterion	Architecture	Furniture	Jewelry	Resume						
details	Columns, ribs, buttresses, counterforces, stained glass	Ornaments (tracery), that copy architectural forms	Imitation of stained glass using stones and enamels	Representa- tion of gothic constructions						
Plastic forms (vertical lines)	Crusade vaults, systems of columns, buttresses, counter- forces and sharpened arches	Representation of columns, ribs and sharpened arches in decorative properties	Sharp vertical forms resembling ribs of gothic cathedrals							
Material	Stone	Wood	Metal, stones							

Architects often constructed two lines of buttresses. The upper line of buttresses was a mainstay for the roof and the lower one was made to fight the force of wind. This innovation transformed the walls from very thick and strong abutment into subtle and thin decorative cover. The walls were not a bearing construction anymore, so the architects could make many huge windows with magnetic stained glasses. The windows almost replaced the walls due to improvement of the technical methods and expansion of inner space.

The interiors of the earlier gothics were quite minimalistic and resembled Romanics. Nevertheless, since the XV century the interior decoration became richly filled with ornaments and looked like miniature cathedrals.

The ornaments could be geometrical or floral. In both cases it was a tracery made with accurately interlaced spherical and straight lines. The result is a difficult drawing that resembles the ribs of gothic constructions. In the picture below you can see the ornamental imitation of the Gothic Rose – a round window above the central entrance of the cathedrals. It was widely used in furniture decorations. Besides, the furniture is richly decorated with wooden and ivory sculptures.

The architectural forms influenced on the jewelry art either. Big jewelry centers were based in France, Germany and Italy in the XII century. Rings with stones were very popular. Rich people wore 4–5 massive rings on one hand. The rings differed according to their functions, for instance there were wedding rings and stamp-rings of the politicians. The jewelers used rich floral ornaments. A crown of Ludovico the XI is a typical example of gothic jewelry art. The vertical lines and sharp forms resemble traditional gothic architecture and colorful stones are miniature imitation of stained – glass. This is one of the first European crowns – an iron crown of the Queen Teodelinda. It was made in Constantinople in 593– 595 years. According to a legend it was made from a nail of Jesus Christ's punishment. On one hand, 8 laminas symbolize 8 corners of Jerusalem while on the other the number 8 represents perfection and eternity. The enamel is also an imitation of stained glass.

Objects of fine arts should be perfect if they are made to materialize divine influence of God. In Middle Ages new philosophical ideas and esthetic images appeared. It' main idea – Christianity – penetrated into people's souls. Great interest to human identity and morality was shown.

And finally let's conclude that gothic art – is the most impressive manifestation of the Middle age. It created colossal architectural ensembles and other masterpieces of monumental arts. It synthesized different kinds of art. Future has shown what grand contribution gothic craftsmen made in global history of fine arts.

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Materials of Conferences

ANALYSIS OF SYNERGIC EFFECT IN COMPOSITIONAL NI-P-COATINGS

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The principal properties of the anti-frictional and firmness for wear of the compositional coats (CC), namely, the velocity of linear wear and the friction coefficient, may be presented in following forms: $I_{lin} = \alpha$ $<I_{in,sol} + (1-\alpha) < I_{in,lub} + \Delta\alpha (<I_{in,sol} - <I_{in,lub})$ and $f=\alpha < f_{sol} + (1-\alpha) < f_{lub} - \Delta\alpha (<f_{sol} - <I_{lub})$. In formulae the symbol $\alpha = \alpha_{sol}$ is denotes the vol-

ume share of solid CC component (in two-component approach), the value $\Delta \alpha = 4(1-\alpha)\alpha^2 (1-k(1+k_{\rm s}))$ is the relative synergic effect of the corresponding property, the parameter k is the dimensional factor, which determined the relationship between particle size of solid CC component r_{sol} and the "width" of the "concentration wave" $\Delta x < i.e. \ k = [r_{_{TB}}/(\Delta x + r_{_{TB}})],$ where $0.5 \le k \le 1$, and the symbol k_n is the nanostructural parameter, which denotes the volume share of the possible nanofragments with definite (spherical or cylindrical) form for solid CC component ($r_{r_{m}} \cong \Delta x$ by $k \cong 0,5; 0 \le k_{u} \le 1$, for example [1–3]).

The main calculation problem of those CC diagnostic properties is the definition of the volume share α and the mean value of $\boldsymbol{I}_{_{lin}}$ and \boldsymbol{f} for both solid and lubricant CC components. The basic causes of approximate information only about qualitative and quantitative phase CC composition under friction and wear are the accompanying processes: a processes of the chemical composition change which is limited by the formation of new possible phases, a processes of the pounding and formation of phase's micro-particles which make difficult the solution of experimental phase analysis problem, and the phases redistribution processes of the chemical system components which may be a cause of origin of the concentration's gradient of some phases.

Taking into account those causes the theoretical way of the phase problem decision is the only way of the dates receiving which may be the base for the possible forecasting of CC diagnostic properties. The technique of the CC receipt is defines the phase composition of cover. The chemical joint precipitation of Ni- and P-containing components from water solution about t = 90 °C and $pH = 5,0 \pm 0,5$ with the following thermal processing about t = 360 °C during one hour. The composition of this solution is following: NiCl, 6H,O (30 g/liter), NaH, PO, H,O (10 g/liter), CH, COONa H₂O (10 g/liter) and the polyvinyl alcohol (0,5 g/liter) as a stabilized addition. For receipt of the corresponding CC the BN (2 g/liter) or/and teflon suspension (T, 5 ml/ liter) were added. After thermal processing of CC the Ni and Ni, P phases of solid component and the BN or/and T phases of lubricant component were obtained. The Ni₁₂P₅, Ni₂P and NiB phases were discover into surface layers under dry friction condition and by specific loading 1 MPa (and by the friction velocity V = 0.048 m/s).

The possible chemical transformations as a probable cause of the Ni₁₂P₅, Ni₂P and NiB phases formation are the next:

(1)-Ni₃B \rightarrow Ni₂B + Ni \rightarrow NiB + 2Ni;

(2)-5 $Ni_{3}P \rightarrow Ni_{12}P_{5}$ + 3 $Ni \rightarrow 2Ni_{5}P_{2}$ + $Ni_{2}P$ + $+ 3Ni \rightarrow 3Ni P + 4Ni;$

(3)-6Ni₃² $P \rightarrow Ni_{12}P_5 + Ni_2P + 5Ni;$ (4)-6Ni + 4BN $\rightarrow 2Ni_3B + N_2 + 2BN \rightarrow 3Ni_2B +$ $+1,5N_{2}+BN\rightarrow 6NiB+2N_{2}$

It's necessary to note the transformations (1) are will be accompanied by partial extraction of the atoms Ni from positions of Ni B crystal structure (after that from positions of Ni₂B structure) and the deformational reconstruction of the Ni-nets and the P-layers (in Ni₂P structure) or P-layers only (in Ni₂P structure). The first chemical transformation in (2) and (3) may be the result of atoms phosphorus diffusion from domain with lowery concentrations of P under local temperature and pressure gradients influence.

Taking into account the solution's phase composition, the possible mechanism of the chemical joint of nickel and phosphorus-containing components from water solution, the possible capture's variants of micro-particles BN and T by these components under CC formation, and the possible chemical transformations processes were received the dates for determination of probable qualitatively and quantitatively phase composition of the solid and lubricant CC components and the corresponding values of α . The certain average values of the $<I_{in}>$ under dry friction condition for the phases of solid CC component Ni and Ni₃P $(\cong 6 \,\mu\text{m/h})$, NiB $(\cong 4 \,\mu\text{m/h})$ and for the phases of lubricant CC component Ni₁₂P₅ and Ni₂P (\cong 7,5 µm/h), BN (\cong 9,5 µm/h) and T (\cong 38 µm/h) were evaluated.

The certain average values of <f> under dry friction condition for the phases of solid CC component Ni and Ni₂P (\cong 0,30), NiB (\cong 0,31) and for the phases of lubricant CC component $Ni_{12}P_5$ and Ni_2P ($\cong 0,04$), BN $(\cong 0,03)$ and T $(\cong 0,05)$. For corresponding values of $\Delta \alpha$ (by k = 0,5 and k_n = 0) the values $\langle I_{lin} \rangle^{calc}$ and $\langle f \rangle^{calc}$ were calculated. Obviously, that the obtained values are corresponds to experimental dates satisfactorily [4, 5].

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TO THE QUESTION ON TRAINING PERSONNEL FOR THE EDUCATION SYSTEM OF THE REPUBLIC OF KAZAKHSTAN

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Since the day of obtaining independence and sovereignty by republic of Kazakhstan large-scale reformations took place within the system of education and especially in the area of higher education. Their purpose is to integrate Kazakh educational system into European space of education. And though certain achievement in this direction are clear, a number of problems remains, particularly in the area of training personnel for the system of education, defined by objective and subjective factors.

If we are to outline basic stages of reforming higher education in RK, they will be presented as follows:

- Stage 1 (1991–1994) – period of foundation and development of legislative and norm-regulative basics of higher education;

- Stage 2 (1995–1998) - stage of initial modernization in system of higher education;

- Stage 3 (1999–present days) – period of decentralization of management and financing of education, broadening of academic freedoms for higher educational institutions.

During the first stage of reforming higher education of the country, the basic problem laid in creating network of higher educational institutions and refreshment of specialties in higher education. Legislative and norm-regulative basis of higher education was enriched in 1993 by new Law of the republic of Kazakhstan "On higher education" (1993). Then in 1994 State standard of higher education of republic of Kazakhstan was confirmed (Basic positions), it defined introduction of multi-level structure of higher education of the country, academic specialties of bachelors and masters.

The second stage is mostly described by acceptation of Concept of state policy in the area of education, confirmed by National council of state policy by President of republic of Kazakhstan on the 4th of August 1995 via accepting new regulations that would control activity of higher educational institutions. It was necessary since private sector of education began to develop intensively during this period. At the same time, educational standards on 310 specialties of higher professional education are introduced in Kazakhstan for the first time, and in 1996 new Classifier (registry) of specialties in higher education of republic of Kazakhstan that includes 342 specialties, is confirmed. The third stage is described as period of decentralization in management and financing of education, broadening in academic freedoms of higher educational institutions. We should underline that before 1999 legal foundations of developing educational system were regulated by two laws: "On education" and "On higher education", accepted in 1992 and 1993. Therefore, in June 1999 a new Law of Republic of Kazakhstan "On education" was accepted. On the 30th of September of 2000 by Order of the President of Republic of Kazakhstan State programme "Education" was confirmed. The following measures were undertaken during the coming years.

1. Transition to new principles of accepting students into universities of republic. On the 24th of April 1999 "New model of forming students' contingent of state higher educational institutions in Republic of Kazakhstan was confirmed, in other words, new model of forming students' contingent in higher educational institutions was introduced via providing students with state educational grants and state educational credits at competitive basis;

2. According to International Classifier of educational systems in 2001, new Classifier of training directions and specialties was developed and introduced, it contained 283 specialties of professional education, 70 masters' and 46 bachelors' directions of training;

3. On the 13th of March 2004 Regulation of Government of Republic of Kazakhstan "On introducing a single national testing" was emitted. According to it, total state attestation of graduates from secondary general education was combined with receiving exams into secondary professional and higher professional educational institutions;

4. Since 2005 the following documents were accepted: State programme of developing education in Republic of Kazakhstan for 2005–2010, State programme of developing technical and professional education in Republic of Kazakhstan in 2008–2012, on 27^{th} of July 2007 – a new law of Republic of Kazakhstan "On education", and on the 18th of February 2011 – Law "On science". As a result of realizing State programme of educational development in Republic of Kazakhstan in 2005–2010, structure of education was adjusted according to International standard classification of education.

5. Nowadays State programme of developing education in Republic of Kazakhstan for 2011–2020 is in force, and further measures on improving quality of special training in all areas of economy, including the area of higher education, is in force [1].

A three-level structure of higher and postgraduate education has been legally fixed in Republic of Kazakhstan: bachorship – master's degree – doctor's degree of PhD. Classification of universities has also been introduced: academies, institutes, universities, research universities, national research universities, national institutions of higher education. At the beginning of 2014 131 university functioned in the country, of them 9 national, 1 international, 1 autonomous, 31 state, and 16 joint-stock universities, 60 private, and 13 non-civil institutions [2]. Dynamics in number of students, undergraduates, doctor candidates who took training in universities during the recent years changed in the following direction:

Academic year 2009–2010 – 610264 students, 14216 undergraduates, 666 doctor candidates;

Academic year 2010–2011 – 620442 students, 16586 undergraduates, 960 doctor candidates;

Academic year 2011–2012 – 629507 students, 21159 undergraduates, 1337 doctor candidates;

Academic year 2012–2013 – 571691 student, 25299 undergraduates, 1377 doctor candidates;

Academic year 2013–2014 – 527226 students, 28103 undergraduates, 1533 doctor candidates [2].

As the presented data shows, during the recent 5 years a sharp decrease in number of students took place (-83028 people) alongside with an increase in number of undergraduates by almost 2 (+ 13887 people) and, therefore, doctor candidates by more than 2 (+ 867 people). On the one hand, this fact reflects problems of demographic situation in bachelorship, on the other hand, the results of transition towards three-level structure of education in RK. As for decrease in number of bachelor students, it is explained by the effect of demographic gap. Number of school graduates, in other words, potential university entrants, decreased from 191000 in 2006 to 138000 in 2010. Since 2007 number of students who take training annually in RK decreased by more than 100000 people (drop by 15%).

Regarding students-bachelors, this fact is defined by the effect of demographic gap. Number of school graduates, in other words, potential university entrants, decreased from 191000 in 2006 to 138000 in 2010. Since 2007 number of students, who take education in RK annually, decreased by more than 100000 people (drop by 15%). It states the fact that number of students who enter universities in RK decreases annually [2]. As demographs predict, such decrease in number of youth in senior school and student's age will continue until 2017-2018. No doubt, complication of demographic situation will cause conflicting processes in development of high school. On the other hand, decrease in number of students defines decrease in state budget financing of higher education. Thus, according to data of the Ministry of education and science of RK, on the 1st of January 2014 144396 people or 27,3 % of the total number of students took education on basis of state educational grant, while 382830 students or 72,7% of total number, were educated on commercial basis. The majority of commercial students take training in private universities. Thus, only 10% of educational organizations' graduates can receive education on state budget, and it decreases availability of free higher education, and volume of state financing can provide only 50% of total needs of economy. Frequently low quality of the provided educational services by private universities defines a trend to take education abroad among the Kazakh youth. More than 20000 people take education in foreign universities nowadays [2].

Thus, nowadays we can outline the following conclusions and problems in training staff for the system of higher education that must be solved in complex:

1. Personnel problem, related to a rapid aging among professors and tutors of universities;

2. Supersaturation of market with private educational institutions that provide higher education. 131 university operates for population of 16 million people;

3. System of managing higher educational institutions does not allow them to realize their potential abilities in providing training that would overtake development of the country's economy;

4. Cost of commercial higher education that sometimes exceeds paying abilities of families with moderate income. Educational costs of Kazakhstan government are usually limited within state universities. Though succession of knowledge and access to education is condition of development for every economy;

5. Conscious transformation of education into the area of making profit, it does not only have a negative effect upon education quality, but also leads to degradation of state. It is claimed by the Universal declaration on higher education for the XXI century which also underlines the necessity of adequate higher education and modern scientific-research institutions that create critical mass of qualified and educated people, without which no country I able to establish real and stable development.

6. Most universities do not bear a direct responsibility for employment of their graduates, especially those who take commercial education. The number of unemployed young specialists remains great as well as those who are employed in a different specialty. The existing duplication in training staff within state and private universities leads to overproduction and different levels of training specialist of similar profile.

However, among all these mentioned problems, the most important is the problem of staff. Aging among university professors and tutors and abolition of old Soviet system of awarding scientific degrees (candidate and doctor of science, cancellation of postgraduates courses) have led to certain disbalances. Thus, part of tutors with scientific degree equaled 49,7% of the total number of 41635 tutors in 2014, including 4116 doctors of science (9,8%) , 15908 candidates of science (38,2%), 694 doctors in philosophy PhD (1,7%). The part of tutors with academic degree equaled 20,7%. Besides, more than half of full-time tutors were women. Their number equaled 26614 people or 64%, accordingly, part of male tutors equaled 36% [2].

In terms of age groups men and women are distributed as follows: under 30 y.o.a. -5% male, 12,9% female; from 30 to 40 y.o.a. -8,9% male, 21% female; from 40 to 63 y.o.a. -15,8% male, 40-58 y.o.a. -24,1% female (preretirement age of 64 y.o.a. and older -6,3% male, over 59 y.o.a. -6% female [2].

Losses, beared by Kazakh science during the years of post-Soviet crisis have led, first of all, to a disappointing aging of scientific staff. Average age of a doctor of science equaled 56 y.o.a., candidate o science – 46 y.o.a., scientific worker / tutor without a scientific degree – 39 y.o.a. Regardless of a certain flow youth into scientific environment, experts claim that the problem of rejuvenation of Kazakh science is far from its solution. All the mentioned factors have created a number of problems: tutors, who received extramural education and never worked in their specialty, have a poor knowledge

in their subject, young tutors, who took education in 1990-ies, had no normal productive practical experience, therefore, know their subject theoretically and have no productive experience. Knowledge that they present during classes, is known to them only in theory, and they have never seen the real process of it. Therefore, there are usually a lot of elder and young tutors at departments, but few tutors of middle age, and this fact affects quality of specialists' training, first of all, for the system of education.

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DIE ANATOMIE DER KOMMUNIKATION: KOMMUNIKATIONSQUADRAT VON FRIEDEMANN SCHULZ VON THUN

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In Studium, Beruf und Privatleben stößt man auf vielfältige Anforderungssituationen, die es zu nutzen und zu bewältigen gilt. Wir benötigen eine Reihe zentraler Fähigkeiten, die in vielen verschiedenen Situationen sinnvoll und wirkungsvoll sind: Schlüsselkompetenzen.

Oft handelt es sich dabei um eine situativ angepasste Balance von gegensätzlichen erscheinenden Anforderungen. Ein Schlüssel zur Bewältigung der Vielfalt an Anforderungen sind kommunikative Kompetenzen, d.h. die Fähigkeit, Gespräche partnerschaftlich und zugleich wirkungsvoll zu führen.

Seit 150 000 Jahren ist die menschliche Art mit der Fähigkeit der sprachlichen Kommunikation begabt. Eine hoch entwickelte non-verbale Verständigung war vermutlich schon viel länger eine wichtige Grundlage des Zusammenlebens in der nomadisierenden vormenschlichen Horde. Man kann ohne Übertreibung behaupten, dass der Erfolg der Art mit der Entwicklung der kommunikativen Kompetenzen ursächlich zusammen hängt. Nur in der Gruppe konnte der einzelne überleben. Die Funktionen der emotionalen und sozialen Bindung sowie des Austausches instrumenteller Kompetenzen in der Gruppe musste durch hoch entwickelte kommunikative Fähigkeiten gesichert werden.

In diesem Artikel geht es um kommunikative Schlüsselkompetenzen.

Worüber wir reden: Vier Themenfelder

1981 sind im deutschen Sprachraum zwei bemerkenswerte Werke zur zwischenmenschlichen Kommunikation unabhängig voneinander erschienen. Das eine wurde wohl bewusst symbolträchtig im Kant-Jahr unter dem Titel "Theorie kommunikativen Handelns" im Suhrkamp Verlag publiziert und ist mit über zwölfhundert Seiten äußerst umfangreich sowie traditionsverpflichtet schwer zu verstehen. Es gilt als das Hauptwerk des international renommierten deutschen Sozialphilosophen Jürgen Habermas, der seine kritische Gesellschaftstheorie auf die wissenschaftliche Grundlage einer "kommunikativen Vernunft" stellen will.

Das andere Werk ist bei Rowohlt als Sach-Taschenbuch unter den Titel "Miteinander Reden: Störungen und Klärungen" verlegt worden, hat in den vergangenen 25 Jahren eine Millionenauflagenhöhe erreicht und dürfte im deutschen Sprachraum inzwischen das bekannteste Kommunikationskonzept der angewandten Psychologie in Bildungseinrichtungen der Wirtschaft und Verwaltung darstellen. Es stammt von Friedemann Schulz von Thun, einem damals noch unbekannten Hamburger Psychologieprofessor und Fachmann für Text-Verständlichkeit. Es umfasst ca. 250 Seiten, die revolutionär einfach geschrieben und leicht verständlich sind. Da geht es um die praktische Verbesserung der alltäglichen Verständigung in Beruf und privatem Leben.

Bei genauerem Hinsehen fällt auf, dass Habermas und Schulz von Thun vier begriffliche Klassen von Aussagen unterscheiden, wenn es um die Frage geht, worüber sich kommunizierende Personen austauschen.

Laut den beiden Werken bewegen wir uns kommunikativ in vier Themenfeldern, wenn wir uns in einer professionellen oder privaten Situation verständigen. In jedem Themenfeld gelten eigene Regeln der Verständigung. Jedes Themenfeld besitzt einen eigenen Thementyp, eine Modalität der Kommunikation und ein Kriterium – einen Gütemaßstab, an dem man beurteilen kann, wie gut Verständigung gelingt (Habermas, 1981, S. 114ff, S. 447ff; Schulz von Thun, 1998, S.26ff). Die vier Themenfelder werden nun vorgestellt und jeweils an einem Beispiel illustriert.

Gesprächsthemen lassen sich also vier Themenfeldern zuordnen. Wir können über Sachverhalte, inneres Erleben, Beziehungen und Maßnahmen reden. Zu jedem Thema passt eine bestimmte kommunikative Modalität. Über Sachverhalte informieren wir uns, Gefühle bringen wir einander zum Ausdruck, Beziehungsdefinitionen handeln wir implizit oder explizit aus und Maßnahmen planen wir gemeinsam. Die Güte unserer Gespräche bemisst sich je nach Thema an einem anderen Kriterium. Sachverhalte können wahr oder unwahr sein. Gefühle äußert man authentisch oder unecht. Beziehungsdefinitionen sind für die Beteiligten akzeptabel oder unannehmbar und Maßnahmen sind effizient oder unwirksam.

Die Anatomie der Kommunikation: Vier Aspekte in jeder Aussage

Unsere Sprache hat nach Schulz von Thun (1991) die Eigenschaft, diese vier Themenfelder in jeder Äußerung unterzubringen, die wir von uns geben. Wenn wir miteinander reden, enthält jede Aussage ausdrücklich oder unausgesprochen: Sachinformationen, eine Selbstkundgabe, d.h. den Ausdruck inneren Erlebens, eine Beziehungsdefinition und einen Appell (Vorschlag zu Maßnahmen), wie zu handeln ist. Diese vierdeutige Eigenschaft der Sprache hat den Vorteil, dass wir sehr ökonomisch und flexibel vier Botschaften zugleich äußern können. Wir informieren über Sachverhalte, bringen unsere Gefühle zum Ausdruck, regulieren unsere Beziehung und schlagen Maßnahmen vor und das alles in einem Atemzug. Ebenso können wir alle vier Aspekte zugleich verstehen.

Diese Eigenschaft hat aber auch einen Nachteil: Sie macht unsere Verständigung anfällig für Missverständnisse.

Wir müssten eigentlich immer auch mitteilen, welchen Aspekt wir zurzeit in den Mittelpunkt der Aufmerksamkeit stellen bzw. in welchem Themenfeld wir uns gerade bewegen. Sonst bleiben unsere Äußerungen immer interpretationsbedürftig. Da wir das nicht immer tun, kommt es häufig vor, dass der Hörer unabsichtlich einen anderen Aspekt des Gesagten in den Mittelpunkt stellt als der Sprecher.

Wenn z. B. ein Ehepaar im Auto sitzt, und die Frau 90km/h fährt, währenddessen ihr Mann zu ihr sagt: "Man darf hier 100 fahren", kann die Frau diese Nachricht auf der Beziehungsebene empfangen ("Er hält sich für den besseren Autorfahrer, der seiner Partnerin helfen muss, da diese eine miese Autofahrerin ist."), wobei der Mann bloß seine Gefühle zum Ausdruck bringt ("Ich bin in Eile, ich bin genervt"). Und anstatt eines gutes Gesprächs haben die beiden einen Streit.

Als weiteres Beispiel aus dem privaten Leben dient die nächste Situation. Als ihr Freund am späten Abend zu ihr nach Hause kommt sagt Tanja: "Lass mich heute bloß in Frieden".

Unter Beachtung der Fragestellung ,Was teilt sie über sich selbst mit?' könnte ihr Freund heraushören, dass Tanja einen schlechten Tag hatte und sich diese Aussage nicht gegen ihn richtet. Da jedoch das Beziehungsohr am ausgeprägtesten agiert, würde der Partner in vielen Fällen diese Aussage auf sich beziehen und es könnte wie auch im der ersten Situation zu einem Missverständnis kommen.

Kompetente Gesprächsführung heißt daher, die vierdeutige Kommunikation möglichst eindeutig zu machen, indem man den Gesprächspartnern dasjenige Themenfeld deutlich macht, um das es einem gerade geht. Gegebenenfalls muss man sich mit den Gesprächspartnern immer wieder darüber klar werden und darauf einigen, welches Themenfeld gerade im Mittelpunkt steht. Das setzt allerdings voraus, dass allen Beteiligten erlaubt ist, jederzeit ein neues Thema oder einen Wechsel von einem Feld zum anderen vorzuschlagen und solche Vorschläge abzulehnen. Kompetente Verständigung besteht darin, einvernehmlich miteinander abzusprechen, worüber genau geredet wird. Erst dadurch kann eine komplexe Problematik systematisch aus vier- und damit auch aus vielfältiger Perspektive betrachtet und bearbeitet werden.

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