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IMPROVEMENT OF THE PROCEDURE OF RECRUITMENT OF PERSONNEL FOR HAZARDOUS WORK ENVIRONMENT

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With the purpose of the reduction of the number of the emergency and abnormal situations in the oil mines conditioned by the influence of the «human factor» an opportunity of application of the system of permit to the works with respect to the real functional state of the personnel is considered in the paper. A «human factor» may become a reason not only for the occurrence but also for the development of the emergency situation according to the unfavorable scenario.

The arduous labor conditions such as heating environment, low level of lighting, high level of the dust load may result in the multiple increase of the negative influence of the factors of the real functional state on the quality and safety of the operations. Reasoning from this fact, the consideration of the factors of the functional state in the process of getting a permit to works in the oil mines is of vital importance and requires a well-reasoned and integrated assessment.

Having highlighted the parameters of the real functional state and evaluated them on the basis of the validated psychophysiological tests the authors managed to join them together into a method of the evaluation of the influence of the functional state of a person on the process of making executive decisions in the emergency situations. When using the developed method, an opportunity of the enhancement of the system of professional recruitment and a process of getting a permit to the hazardous operations for both the supervising manpower and the operation personnel occurs.

The method draws on the considerable volume of the applied experimental studies which were pursued on the basis of the facilities of the oil and gas complex. The data obtained allow to make conclusions about the feasibility of an insert new criteria of the evaluation of the readiness of a person to perform the job responsibilities. Applying the obtained criteria makes possible to create measures for the psychological adaptation of the personnel, for the improvement of the labor discipline, for the increase of the safety of operations in the unique Yarega oil mines.

Key words: permit to work, professional recruitment, oil mines, human factor aspect, functional state

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Introduction. A procedure of a getting a permit to the hazardous work environment at the oil mines consists of several stages; the professional recruitment is considered to be the first one. The recruitment process includes interviewing a candidate, a job task solution and a medical examination. The medical examination, as a rule, is performed by an external company and an enterprise (employer) receives only a final medical approval. Further, more cyclic stages of training take place as well as passing the exams covering the issues of the safe methods of performing the operations and, finally, a sobriety test is conducted immediately before descending into the mine. Considering such a sequence, the sobriety test is regarded to be definitive and incontestable meanwhile going through the procedure of testing may be affected by the range of factors. A part of these factors is represented by the factors of a real functional state of a person, including the following: physical, mental and chronic fatigue; positive, negative and anxiodepressive emotionality; state and trait anxiety; degree of comfort. It is worth mentioning that a state which a person has during the examinations is not taken into account either in the process of tasks solution and passing the tests or going through other integrated procedures of a higher level [13- 16].

The Minnesota Multiphasic Personality Inventory (MMPI) is a well-known personality inventory in the area of psychodiagnostics. MMPI was created in 1942-1944 for the purposes of the professional selection of pilots during World War II and, for the moment, this inventory is not used in the systems of professional recruitment and is solely a tool of clinical diagnostics. After decades of a clinical use and some extra research of its validity the conclusion that the MMPI is not a completely adequate tool for the valid psychodiagnostics was made. Many of the normal test subjects are highly evaluated in accordance with the clinical rating scales [10, 11].

The analysis of the functional state of an employee in real working conditions is inevitably beyond only the physiologic aspects and supposes the development of the psychological and psychosocial aspects of the issue [5, 12].

Based on the above, a task concerning the development of the method of evaluation of the influence of the functional state of a person on the resolving professional issues was created; such a

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method should include both the valid tests for the determination of the parameters of the real functional state and job task solution tests.

Methodology. The professional tasks devoted to the incident and emergency responses were taken as the basis. An indicator of the correctness of dealing with the tasks per time unit τ was inserted to take into account the response time and the correctness of dealing with the professional tasks.

Fig.1 presents the algorithm of the developed method which includes the following stages:

1. A testing stage. A test to reveal the functional state of the test subjects was conducted.

A mix of seven validated methods was used; all of these methods were standardized on various samples of test subjects and proved to be successfully used in the real conditions for the evaluation of the subjective components of the state of a person. For the purpose of revealing the parameters of the real functional state the following methods of testing were used [6]:

Factor	A method used
Degree of comfort	Scale of state
Physical fatigue	Inventory for the evaluation of the acute physical fatigue
Mental fatigue	Inventory for the evaluation of the acute mental fatigue
Chronic fatigue	Personality inventory «Level of chronic fatigue»
Positive emotionality Negative emotionality Anxiodepressive emotionality	Differential emotions scale (DES)
State anxiety	Scale of the state anxiety
Trait anxiety	Scale of the trait anxiety

2. A stage of making a decision. Each participant was provided by a certain task (an emergency situation).

A layout with the marked impact areas (damage zones) for various scenarios of evolution of the emergency situation is handed out. A test subject is provided with the time needed to study an object.

A background information regarding the situation is provided. A time limit needed for each participant to make a decision concerning the emergency situation response and containment is recorded.

3. A stage of the experimental data analysis. The results obtained are processed according to the following scenario: the points of the indexes of the functional state should be converted into the percentage where 100 % coincides with the maximum possible point. The method contains a list and a system of the evaluation of the personnel actions during an emergency situation in accordance with the emergency response assistance plan [1, 6-9].

4. A stage of the evaluation of occupational aptitude level and the development of the recommendations regarding the improvement of the results.

A system «human – engineering system – production environment» is a derivative of the system «human – machine». As an indicator of the «human – machine» system reliability a P_{shm} parameter is used; this parameter depends on a probability of correct solving of a problem P_{cs} and a probability of timely solving of a problem P_{ts}.

For the purpose of taking into account a time for the emergency response and a time needed for correct dealing with the task of the emergency response an indicator of the correctness of dealing with the task per time unit was inserted

$$\tau = \frac{P_{cs}}{t},$$

where t – time needed for response (making a decision).

Having experimentally revealed the dependency between indicator of correctness of solving of a problem per time unit, time of response and a psychophysiological state of a person it is possible to determine a «normal» risk – a statistically average risk for a person dealing with a certain task provided with the given psychophysiological parameters [2, 4]. By obtaining the designed values it becomes possible to evaluate the state of a person – to what extent a person is resistant to fatigue, emotionality, anxiety and influence of other factors. In case the personal indicator τ exceeds the designed average under the given value of the factor means that the manager is resistant

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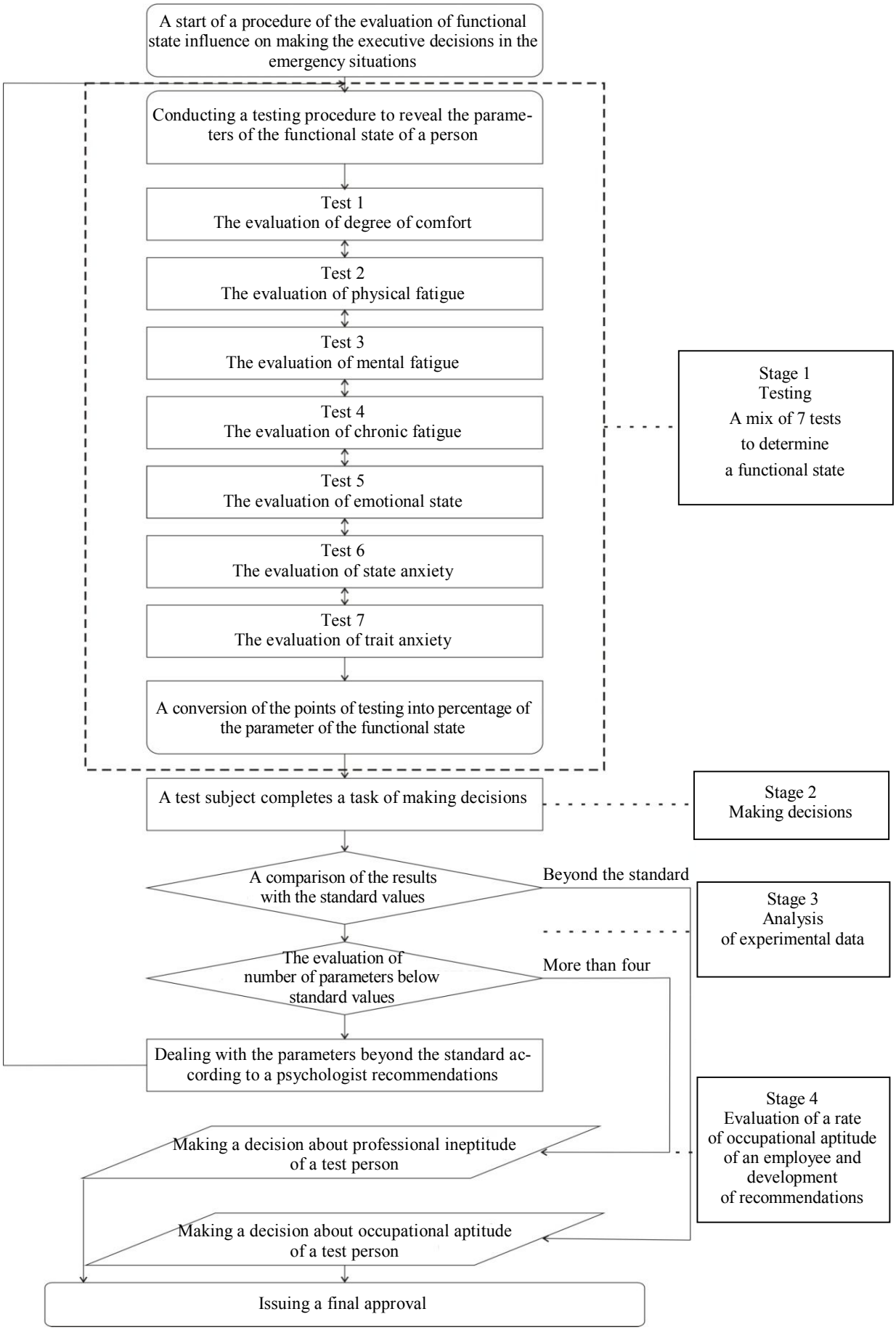

Fig. 1. The algorythm of a method of evaluation of the influence of a functional state of a person on a process of making professional decisions

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enough and capable to make a prompt and correct decision regarding the emergency response.

Results and discussion. As an example we may provide the obtained results of the parameter «Chronic fatigue». The results are represented in the graphical view in the Fig.2.

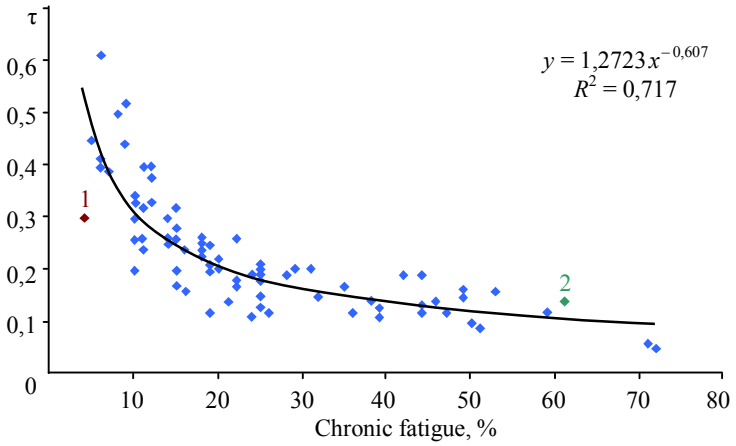

Fig.2. Dependency of a correctness of dealing with the task per time unit with respect to chronic fatigue of an employee

As we may see, a test subject number 1 coped with the task better then than the test subject number 2. However, the test subject number 1 is in the optimal functional state and its result is lower than the results of the test subjects with the same level of chronic fatigue. Rather high level of chronic fatigue may be the reason for obtaining a poor result by the test subject number 2; but at the same time, his result is higher in comparison with the results of the test subjects with the same level of the chronic fatigue. Consequently, we may conclude that the test subject number 2 is the most trained for the performing professional duties in the hazardous environment of the oil mines. The test subject number 1 may be given some recommendations regarding working on the improvement of the parameter «Chronic fatigue» with the professional psychologist. When analyzing the data considering all the factors there appear an opportunity to come up with the new ergonomic solutions regarding the system «human – engineering system – production environment» [3].

Conclusion

1. Modern systems of the professional selection and recruitment and getting permit to hazardous works do not take into account the real functional state of a candidate.

2. A developed method of the evaluation of the influence of the functional state of a person on the process of making professional decisions allow to conduct the experiments of accumulation of the data base in respect of a human efficiency in the system «human – engineering system – production environment».

3. Focusing on the data which were obtained during the experiments conducting on the basis of the developed method there is an opportunity to improve the indicators of the employees whose result occurred to be lower than the average values. Consequently, it becomes possible to reduce the risk of the wrong or delayed actions.

4. It is necessary to continue the studies regarding the influence of the functional state of a person on the process of making professional decisions in terms of the influence of certain factors and an integrated effect.

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