Katalyzator, catalysis, yzbyratelnost action, acid, alkali, oksydы, fermentы, reaction.

We characterize the promising areas of the catalysts in the reactions of biodiesel production from vegetable oils and animal fats technology, given their classification and methods of application.

The catalyst, catalysis, selectivity, acids, alkalis, oxides, enzymes, reactions.

UDC 631,363,004

Approach to assessing the reliability index of complex technical systems "man-machine"

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The paper analyzed the research to ensure the reliability of machines, systems as "man-machine". Formed main areas of software reliability.

Machine, system reliability, operator.

Problem. Analysis of the main trends of the modern complex technical systems "man-machine" (CCC "PM"), which include farming shows that these systems have a number of features, including the following: the presence of elements, subsystems and relations between them; hierarchy and the possibility of structural mapping; versatility and technical state of uncertainty during all life cycles; Multivariate implementation of management functions at each of its levels; dependence CTC reliability of component reliability "Machine" and "human operator."

Analysis of recent research.One of the main features of modern STS "PM" is that their structure and parameters
may change under the influence of objective and subjective factors, indicating the need to ensure their reliability required and is one of the important ways to increase their effectiveness. Machinery and equipment for agricultural production, particularly high-tech and durable, require the services of technical service, that complex maintenance and repair of machines.

One of the promising areas of software reliability CCC is the development of engineering services farms and enterprises of technical service, attracting manufacturers of machines

and equipment in sales, repair and maintenance of its products during the warranty and post-warranty periods of operation.

According to scientists and professionals from different sectors of the economy [2, 5, 6, 9], one of the principles in structural transformations to ensure the reliability of machines and equipment (CCC "LM") should be to ensure factories and companies-manufacturers warranty lifetime, efficient use appliances sold during the whole period of operation of the consumer, including recycling. Plants and enterprise manufacturers must address the issue of their products specifications and technical documentation, spare parts, after-sales service and training of qualified personnel.

Increasing Effectiveness of the reliability of machinery and equipment largely depends on training managers and professionals with modern advanced technology maintenance, repair and development of the economy. A significant contribution to the organizational and methodological foundations of training made the work of scientists [1, 2, 6, 7].

The purpose of research.Addressing these challenges the organization and management and reliability CCC "LM" directs engineering and technical service agricultural and service on a long-term development strategy.

Results. This strategy should take into account market conditions and the state machinery, especially the formation and placement services market enterprises, training and staff development. The dominant role in this strategy should take technological preparation company that is able to respond quickly to change the range of services and repair. In today's context technological preparation of production - a set of measures that ensure technological readiness and enterprise determined by the presence in them of complete sets of technological documentation of technological equipment and qualified personnel necessary to perform a given volume of maintenance work with the relevant technical and economic indicators.

Components of "machine" and "human operator" are considered as components of CTC "LM" effective functioning of which is a necessary condition for achieving a given level of reliability. One common situations presented evolution of STS "LM" may be events when the time in service for a total natural aging STS becomes inoperable in the refusal component "machine" or component "human operator." Then the graph of states and transitions such STS can be represented as follows (Fig. 1).

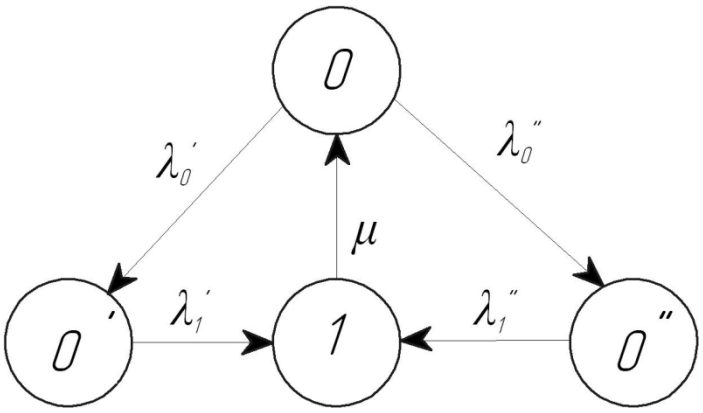

Fig. 1. Count the states and transitions STS system "LM": "0" - working condition; "1" - inoperable (elimination of operator failures and eliminate failures machines); «$0'$"- Intermediate (fictitious state) aging operator; «$0''$"- Intermediate (fictitious state) aging machines $\lambda_0', \lambda_0'', \lambda_1', \lambda_1''$ - Failure rate components; μ - Intensity restorations components.

CTC "LM" starts by working status "0". This condition is characterized by the fact that the components of "machine" and "human operator" is in working condition. Later on, during operation, resulting in moral and physical "aging" component "Machine" goes into inoperative (fictitious) state "$0''$". In the process of "aging" complicated machinery failure, increases their complexity and time to upgrade them. STS Component "PM" "human operator" also remains unchanged and can go into inoperative (fictitious) state "$0'$". This transition CCC "LM" makes it possible to follow the behavior of components. It is possible by introducing a fictitious description of the states "$0''$"And"$0'$"To simplify the task of solving mathematical formalization STS operation for the case when the intensity of transitions from state to state are the values of variables [1]. The reasons for this transition components of the "human operator" in several inoperable. First of all, when you receive a new machine, the operator starts acquainted with its structure, especially the operation, maintenance and repair. This is the reason for reducing the probability of failure of the system under the influence of the operator during prypratsyuvannya and installed during normal operation. This period is delayed even longer if the operator qualifications, insufficient, or if the operator changes the type of work often. Another reason could be low qualification operator who holds the timely removal Bounce disability or does not provide the quality of service.

The next step is to move the components of "machine" and "human operator" in state "1" - inoperable STS (eliminating bounce human operator and machine failures).

These reasons lead to a decline in component reliability "Machine" [8] and reliability component of "human operator" [4]: the probability of error-free operator, timeliness solve the problem and correct the error probability operator. That is a decrease in professional and psychological level or "aging" operator.

Experience in the use of agricultural machinery shows that one of the reserves increase vocational and psychological level of "human operator" is a quality training and qualification. That level of reliability STS "LM" can increase not only by the repair and maintenance work, but also by improving component "human operator."

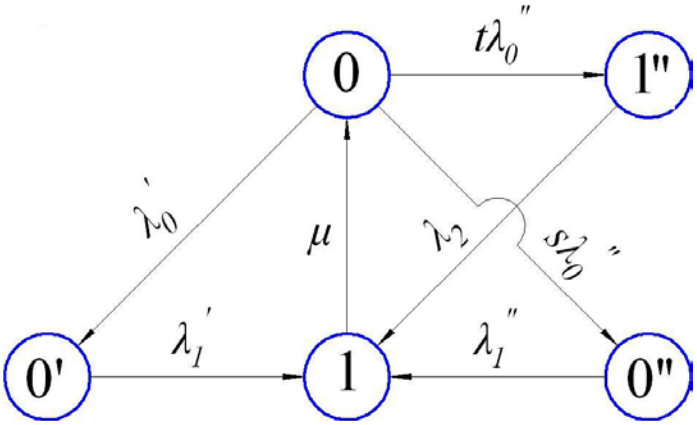

Fig. 2. Count the states and transitions CCC "LM" for the "aging" of machines and operators that enhance their vocational and psychological level "0" - working condition; "1" - inoperable (elimination of operator failures and eliminate failures machines); «$0'$"- Intermediate (fictitious state)" aging "of the machine; «$0''$"- Intermediate (fictitious state)" aging "of the operator; «$1''$"- Intermediate (fictitious state) to improve their vocational and psychological level operator; $\lambda_0, \lambda_0', \lambda_0'', \lambda_1, \lambda_1''$ - Failure rate components; μ - Intensity restorations components.

Count of states and transitions CCC "LM" for the "aging" of machines and operators that enhance their vocational and psychological level can be represented in Fig. 2. The work of this STS "LM" begins with "0", which corresponds to an efficient system state when both components are "L" and "M" are working in the initial position. Suppose that over time, with the gradual aging STS is the accumulation of failures of components "L" and "M" and they can go to one of the fictitious states "$0''$"To" L "or"$0'$"To" M ". With "0" CCC "LM" can go to the state "$1''$"- Intermediate (fictitious state) improve their professional operator and psychological level.

With state "$1''$"CTC becomes inoperative in the state of" 1 ", ie eliminating failures human operator and eliminate failures machine.

Improving their condition human operator can achieve through education: primary training, training, training.

For a quantitative description presented in Fig. 1 and Fig. 2 counts of states and transitions drawn differential equations of dynamic balance of probabilities for states CCC "LM" for the solution used Cramer's rule and Gauss [1, 9].

This again indicates that to ensure the required level of reliability STS "LM" machinery and agricultural equipment and components to form a long-term strategy for the functioning of engineering services and service enterprises, organizational and methodological bases of support.

The practical confirmation of theoretical research and provisioning to ensure reliability CCC "LM" can be study of the quality of the performance and initial training, training, training for certain types of economic activity, including agriculture [3]. These indicators employees by economic activity in the Kyiv region in 2012 are presented in Table 1 [3]. Analysis of Table 1 indicates the insufficient level of initial training and retraining of workers in agriculture. Overall, in 2012, in the Kiev region accounting number of staff in different economic activities amounted to 383 312 people, and taught new professions (primary training, retraining) 11 049 people, representing 2.9%. At the same time, agriculture, hunting and related services accounting number of staff is 35 245 people and taught new professions (primary training, retraining) 153 people, representing 0.4%. That is, it is 7 times less than taught new professions in general for all industries.

Analysis of qualitative composition and qualification agriculture, hunting and related services in Kyiv region in 2012 are presented in Table 2 [3]. Statistical analysis of the data indicates a very low level of training of agricultural workers in terms of the following categories: managers - 0.3%; professionals, specialists - 0.3%; technical employees - 0.3%; and other skilled workers - 1.1%; workers who have raised the qualification level - 0.9%.

1. Quality of teaching and professional employees by economic activities Kyiv region in 2012.

Title	number of staff at year-end	Employees with higher education in educational levels		Trained new professions (primary training, retraining)				
				Total				Including

								Vocational	Higher (I-IV accreditation levels)
Total	383 312	83077	114 136	11 049	2.9	8647	2402	1955	447
Agriculture, hunting and related services	35 245	4257	4416	153	0.4	65	88	81	7
Public administration	22 226	5768	11705	325	1.5	204	121	52	69

It should be noted that a significant percentage of workers is not training in schools, and directly in manufacturing, which is not always a positive effect on the quality of training. This especially applies to the following categories of employees as managers, professionals, technicians and technical employees.

Conclusion. Thus, it can be argued that to achieve the required level of reliability STS "LM" should pay more attention to research and development component of "human operator." The problem of effective use of this component is of particular relevance in recent years, when the Ukrainian market rapidly coming multioperationa modern machines that require highly skilled engineers, operators, machine operators, drivers and customer service specialists. The set of measures on training, retraining and qualification should be the basis for a long-term strategy to ensure reliability CCC "Man-Machine", which are machines and equipment for agricultural production.

2. The qualitative composition and qualification agriculture, hunting and related services in Kyiv region in 2012.

	number of staff at	Improve skills			
		Total	nt number,	manuf	educati

Agriculture, hunting and related services	35 245	695	2.0	337	358
- Heads	-	89	0.3	11	78
- Professionals, specialists	-	116	0.3	38	78
- Technical staff	-	107	0.3	70	37
- Skilled and other workers	-	383	1.1	218	165
- Workers who raised the qualification category	-	312	0.9	173	139

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In Article conducted analysis of research nauchnыh napravlennыh Provision for nadezhnosty machines As of "man-machine". Sformyrovanы Basic Provision direction nadezhnosty systems.

Machine, system, nadezhnost operator.

The paper analyzes research to ensure the reliability of machines, systems as «man-machine». Formed the main directions of reliability systems.

Machine, system reliability, operator.

UDC 517.926

Iterative algorithm of solution of boundary value problems with SLABONELINIYNOYI impulsive (non-critical case)

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Sufficient conditions for the existence of solutions of boundary value problems slaboneliniynyh uncritical impulsive. A convergent iterative algorithm for their construction.

Boundary value problem, impulsive action, generalized Green's operator, the method of simple iteration.

Problem. This article contains material that is of interest to specialists in the theory of boundary value problems and nonlinear oscillations and contribute to the development of constructive numerical and analytical methods for studying the boundary value problems.

Results. Let $rank\, Q = n$. In other words, suppose that the homogeneous boundary value problem of impulsive

$$\dot{z} = A(t)z, t \neq \tau_i, \quad \Delta z_{|t=\tau_i} = S_i z, \ t, \tau_i \epsilon [a, b], i \epsilon \mathbb{Z} \tag{1}$$

$$lz = 0 \tag{2}$$

has no solutions, except for the trivial. While generating boundary value problem

$$\dot{z} = A(t)z + f(t), t \neq \tau_i, \quad \Delta z_{|t=\tau_i} = S_i z + a_i, \ \tau_i \epsilon [a, b], i \epsilon \mathbb{Z} \tag{3}$$

$$lz = \alpha, \ \alpha \epsilon \mathbb{R}^m, t \epsilon [a, b] \tag{4}$$

at those and only those for which fair condition $f(t) \epsilon C([a, b]/\{\tau_i\}_I)$, $a_i \epsilon \mathbb{R}^n, \alpha \epsilon \mathbb{R}^m$,

$$P_{Q_d^*} \left\{ \alpha - l \int_a^b K(\cdot, \tau) f(\tau) d\tau - l \sum_{i=1}^p \overline{K}(\cdot, \tau_i)\, a_i \right\} = 0, d = m - n, \tag{5}$$

has a unique solution

$$z_0(t) = \left(G \begin{bmatrix} f \\ a_i \end{bmatrix} \right)(t) + X(t) Q^+ \alpha, \tag{6}$$

which will be called generating for the boundary value problem of impulsive