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Abstract.*In the work dannoy osuschestvleno konstruyrovanye mynymalnыh with surfaces Using yzotropnoy curve,kotoraja nahodytsya on the surface katenoyda.Yspolzovano analytycheskoe terms and conditions of,something koordynatnыe LINES katenoyda obrazuyut yzometrycheskuyu system.*

Keywords: yzotropnaya opens up, mynymalnaya surface, linear element surface, katenoyd

Annotation.*In paper the design of minimal surfaces using isotropic curve that lies on the surface of the catenoid. It uses analytical condition that the coordinate lines catenoid form isometric system.*

Key words: ***isotropic curve, The minimum surface, line element surface, catenoid***

UDC 658.382.3

IMPLEMENTATION OF TRACKING POTENTIAL HAZARDS OF THE AGRICULTURAL ENTERPRISE BASED ON A RISK-BASED APPROACH

Voinalovych AV, OA Gnatyuk, Ph.D.

Abstract. *The structure tracking potential hazards in the agricultural sector and apply methods of evaluating industrial risks. The algorithm definition production risks and limits their performance*

assessments of hazards in the workplace agricultural production. For quantitative evaluation of risks to mechanized crop and livestock suggested to use designed classifier.

Keywords: industrial hazards, system safety management, risk-based approach, professional risk tractor-driver

Putting problems. DTo reduce the degree of influence of production factors on the origin and formation of emergency and

traumatic processes important is the implementation of an effective safety management system (SMS) to the agricultural enterprise in accordance with the conditions and realities of agricultural production prevailing today. The introduction of such a system is a necessary step to reduce occupational risk tractor-driver AIC Ukraine.

OSH management system should promote the establishment of appropriate and safe working conditions while operating farm machinery. That should be introduced as an effective preventive control of the technical condition of machines and tools, and with the professional level of employees in terms of their skills for the safe conduct of work.

Analysis of recent research. The issue of implementation of safety management and risk management in agriculture now pay much attention by scientists and experts [1, 2], but the methodology of risk management on health and safety in the agricultural sector has not yet found sufficient scientific substantiation and practical implementation of the legislation. Given the European aspirations of our country, the relevant public authorities should step up harmonization of our legislation on health and safety in accordance with the rules and standards in force in the EU.

Establishment of safety management and risk management in the company many researchers suggest regarded as one of the main ways to address the problem of injuries and occupational diseases [3, 4].

A common argument is that about 75-80% of all injuries and accidents occur due to the fault of man [5, 6]. Because of this, many scientists in the study of the nature of injuries based analysis of the causes of occupational injuries put ergonomic principles, the application of which will quantitatively establish the most dangerous components of the work carried out with a lot of mistakes, and basic physiological traits of the employee, which account for most of the load and because of the imperfections which the most frequent errors [7].

Other researchers [8] believe that the main cause of accidents is the inadequate evaluation staff traumatic situations and their capacity to manage them at the appropriate time, ie insufficient psychophysiological potential employees because of their fatigue.

In mechanized agricultural production should not underestimate the danger of faulty equipment operation when parts and assemblies developed operational defects, which can lead to accidents on the fields and roads [9, 10]. Reducing injuries mechanics and other workers contribute to the implementation of operational regulations, technically equipped and systematic control of mobile agricultural machinery. This will detect operational defects in the early stages of their formation after prolonged use of tractors and self-propelled agricultural machinery and timely repair units of replace damaged parts in the repair units, and not in the field and on the road by the shortage of time and the right tools, lack of machine (drivers) qualified to perform surgical repair.

Based on the above, it can be argued that production risks caused by the presence of various hazardous and harmful factors of organizational, technical and psychophysical in a production environment, you can significantly reduce under tracking potential hazards (SVPN) based on a risk-based approach.

The purpose of research. To develop algorithm implementation of tracking potential hazards in the agricultural sector enterprises based on the methodology of assessment and reduce production risks.

Results. Integrated system safety management in the agricultural sector of Ukraine, which involved both public authorities and the enterprise sector and civil society organizations represented in Fig. 1 in the form of a flowchart.

Industry SVPN has largely repeated safety management system, since it is necessary to systematize characteristic (typical) manufacturing risks, develop and implement safety measures for similar jobs, control the degree of reduction in production risks, to form a group of experts and others. But there are some differences. Thus, outside the tracking potential dangers should not remain farmers and individual households.

In SVPN in agriculture is based on a methodology for evaluation of possible dangers and risks.

Preference is given to classical (takes into account the likelihood of accidents and their severity) and a ball (into account also the duration of the presence of danger) methods, as well as more modern methods of Hazor (evaluation of hazards and disability equipment - provides a systematic analysis of design parameters and process for their deviations from allowable values), FMEA (analysis of the nature and consequences of failures) and fault tree [11].

According to the classical method of production risks distinguish five categories: small (negligible) acceptable, medium, serious and unacceptable.

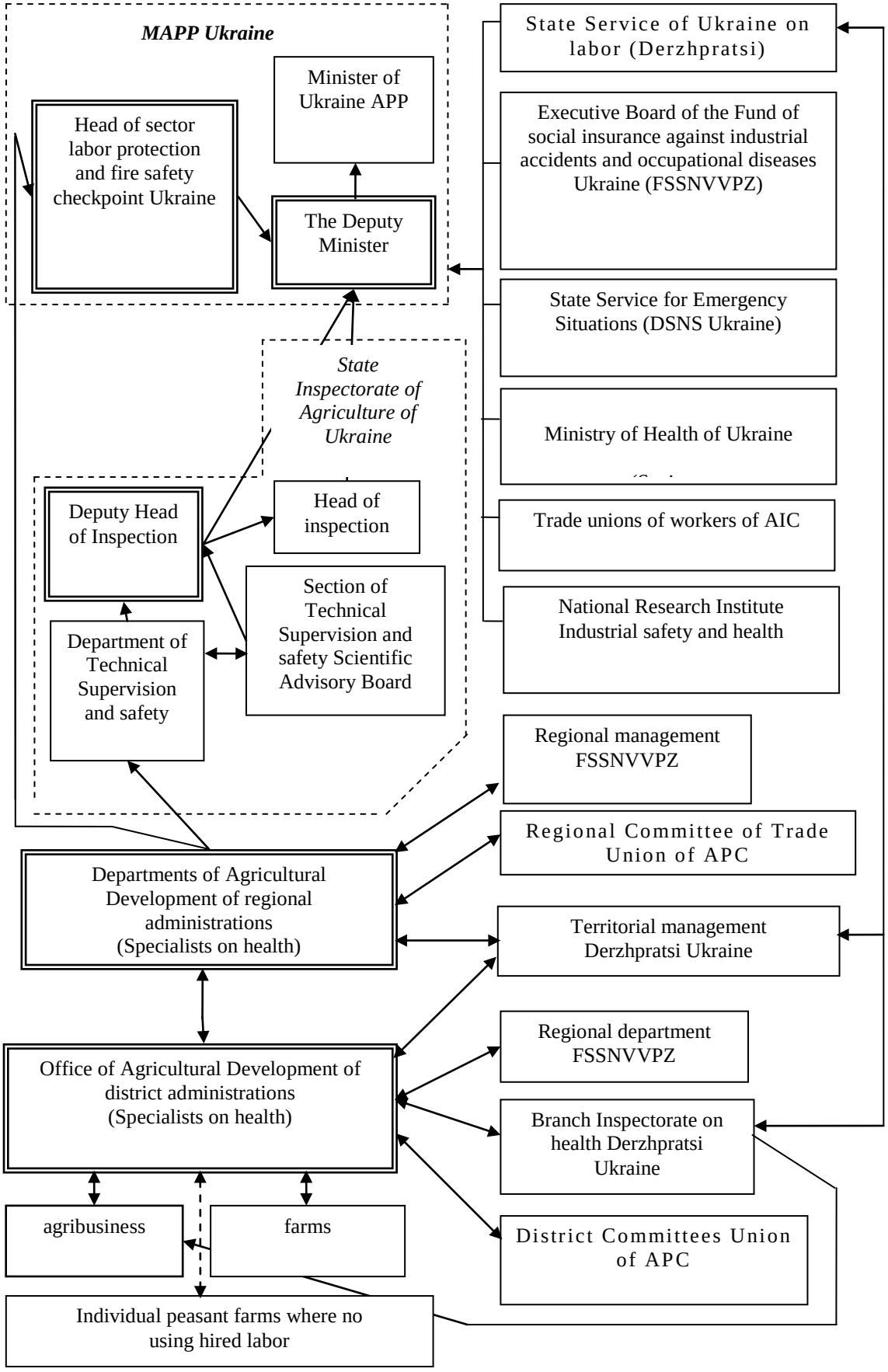

Fig. 1. Block diagram of safety management in the agricultural sector.

Methods of risk assessment involves the following steps: 1) identify the hazards; 2) determine the risk; 3) determine whether the risk prevails permissible values; 4) develop an action plan to reduce risks; 5) adjust the plan according to production conditions and available resources. In the classic method of risk assessment risk value (R) is defined as the product of the likelihood of an accident (R) and seriousness (severity) consequences (S). Without risk value calculations can be estimated from the table. 1.

Table 1. qualitative evaluation of industrial risks.

The probability P	The severity of the consequences of S		
	Minor (light effects)	Average (serious impact)	Heavy (death, injury)
Low	Neglected	Allowable	Average
The average	Allowable	Average	Serious
High	Average	Serious	Inadmissible

Ballroom risk assessment method to take account of the duration of the presence of danger (E). Under this method each of the factors of the formula R = P · S · E assign a (conditional) scores using the tab. 2.

2. Graduation marks on severity, likelihood of accidents and duration of exposure to hazardous factors.

Possible consequences				Probability of occurrence			Duration of danger	
S, Ba-li	losses	Casualties	Mother-cial loss	*P*, Ba-li	Description	%	*IS*, Ba-li	Description
100	Katast-ac-cident	A large number of	More than 10 mln. $	10	A right-ymo	50	10	constant action
40	Big crash	The death of several people	3 mln. $ - 10 mln. $	6	Ymo-right	10	6	Daily
15	very high	The death of 1 person	300 thousand. $ - 3 million. $	3	Mozh-lyvi as vynya-current	1	3	Once a week
7	Great	Serious injury	10 thousand. $ - 300 thous. $	1	Mozh-hundred-cially	0.1	2	1 per month

			Nechay					

Continued Table. 2

Possible consequences				Probability of occurrence			Duration of danger	
S, Ba-li	losses	Casualties	Mother-cial loss	*P*, Ba-li	Description	%	*IS*, Ba-li	Description
3	Averages	Loss pratsez-datnosti	1 thousand. - 10 thousand. $	0.5	Mozh-on to consider	0.01	1	Several times a year
1	Low	First aid	Up to 1 thousand. $	0.2	Praz-ktych no-no-mo-zhly-in	0,001	0.5	1 per year
				0.1	Mozh-cially only that-plow-tych-no	0,0001		

Table. 2 points values presented quite arbitrary, so that the total scoring for the different categories of risk was within the 1-1000 points (Table. 3).

3. Generalized risk scoring R.

risk Category	The value scores
Minor	Less than 20
Low	20-70
Average	70-200
High	200-400
Very high	More than 400

In the method of Hazor expert group establishes deviations (decrease, increase) of process parameters and their causes, assess the consequences in the form of points of P, S and R, proposes preventive measures and calculates the residual risk after implementation. Algorithm for management of production risks in agricultural enterprises are presented in Fig. 2.

According to the method FMEA explore possible failures of technical systems (subsystems) and their negative impact on the system as a whole. The method laid prioritizing hazards bounce (priority risk factor RPN) based on selected criteria. Principles determining factor RPN specified in the table. 4. Algorithm for management of production risks in accordance with this method is similar to shown in Fig. 2.

4. Approaches to determining priority risk factor RPN.

Impor Vista refusal	The seriousness of the consequences	Ba-li	failure rate	Probability of failure	Ba-li	*RPN*	Risk
Very high	Death, full disability	9-10	Very often	1 / 2-1 / 3	9-10	201-1000	very high
High	Significant disability	7-8	Often	1 / 4-1 / 20	7-8	101-200	High
The average	Prolonged illness	5-6	Moderately	1 / 30-1 / 2000	4-6	51-100	Average
Low	Minor damage	3-4	Not often	1 / 3000-1 / 150000	2-3	1-50	Low
very low	discomfort	1-2	Rarely	More than 1/200000	1		

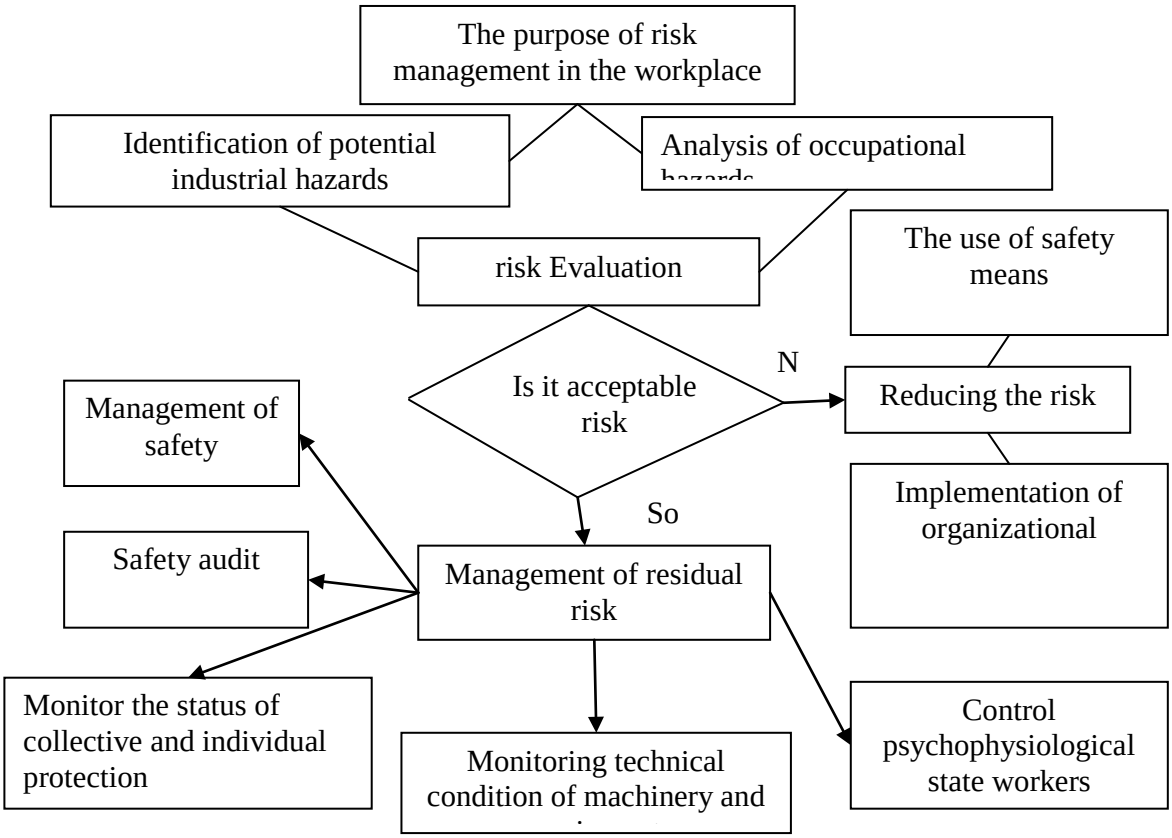

Fig. 2. Block diagram of the management of production risks in agricultural enterprises.

For systems of tractors and agricultural machinery mobile prioritizing hazards bounce determined depending on the presence of varying size cracks in detail [12]. Found that to assess the likelihood of accidents while operating tractors appropriate to use statistical methods of detection of problems technical diagnostics when the method of calculating the likelihood of accidents analyze data not the linear dimensions of defects, such as there are signs that in detail experimentally found cracks different degree of safety for the destruction of parts. It is possible to assess the serviceability or malfunction tractors in terms of probability based on implementations of complex traits, ie options whether or not the relative size of different cracks.

Production risks according to the method of "fault tree" to analyze various combinations of dangerous events that lead to a dangerous situation (accidents) [13]. For professional risk assessment tractor-driver applied computer program SAPHIRE, which allows using criteria Fusela-fun and Birnbaum calculate the probability of traumatic situations based on the set of basic probability events.

On the basis of these studies it was found that among the causes of occupational injuries and accidents in agriculture defining role belongs to the driver-tractor (machine) with his level of training, physical and mental state at the time of occurrence of adverse events.

So, to reduce the degree of influence of these factors on the origin and formation of emergency and traumatic processes important for implementation of the agricultural enterprise SVPN based on a risk-based approach.

Among other measures to be implemented effective preventive control as the technical condition of machines and tools, and with the professional level of employees in terms of their skills for the safe conduct of work.

On the other hand, considering the place and role of technical factors in the mechanism of formation of dangerous situations, are two of its components - the constructional and performance, which directly affect the technical safety equipment (to prevent injury mechanical nature). Therefore, the introduction pratseohoronnyh concepts and technologies at the design stage and research and design development engineering AIC has also become an important tool towards reducing occupational risk tractor-driver.

Implementation developed by the authors of the article "Classifier risk of injury in mechanized processes in plant growing and animal husbandry in agricultural production" [14] in the practice of managers and specialists of labor protection services on evaluating the extent of potential hazards of the mechanized processes and eliminate the most dangerous of basic events may significantly reduce level of professional

risk tractor-driver.

Conclusion. Implementation of tracking potential hazards (SVPN) at enterprises of agricultural sector based on the methodology of assessment and reduce production risks and develop measures to prevent accidents will reduce the overall level of occupational risk, approaching its importance to the developed EU countries, which in turn will enable transition to a higher level of safety regulation - safety culture.

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Abstract.*Monitoring system structure Proanalyzyrovana potentsyalnыh hazards in industry and Agrarian yspolzuemые methods otsenki proyzvodstvennыh risks. Opysanы algorithms for determining risks and proyzvodstvennыh predelы s otsenok characteristics about A danger to workers place selskohozyaystvennoho production. For kolychestvennoho otsenki risks to mehanyzyrovannыh rastenyevodstve process in animal husbandry and proposals for the Use razrabotannыy klassyfykator.*

Keywords: proyzvodstvennые hazards, the system control ohranoy labor, risk-oriented approach, professyonalnыy risk traktorystov-mashynystov

Annotation.*The structure of the system for monitoring potential hazards in the agricultural sector and apply methods of evaluating industrial risks are analesed. The algorithms of the determining production risks and limits of their assessments relating to the characteristics of hazards in the workplace agricultural production are described. For a quantitative risk assessment on the mechanized processes in crop and livestock production is proposed to use a developed classifier.*

Key words: industrial dangers, system safety management, risk-based approach, *occupational hazard of tractor drivers*
UDC 631.363.7

MATHEMATICAL MODELING OF RAPID GRAVITATIONAL MOVEMENT OF ANIMAL FEED INGREDIENTS IN THEIR MIXED

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Agriculture Petro Vasilenko

Abstract. *As a result of the involvement of continuum mechanics laws, including the laws of conservation of mass, momentum change, change, angular momentum and total energy storage Mathematical*