Logistics Risk Identification of New and Renovated Production Machines

Identifikacija logističkog rizika novih i renoviranih strojeva za proizvodnju

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Summary

The paper deals with logistics risk management safety program of new and renovated machines, which as members of the management of company must deal with. There are accountable consequences of untreated risks that may stop a dangerous event. In this case, damage can be life or health of users or it can create damage to their property i.e. that may end up as damage of the machine. Contribution from own perspective is focused on: defining the basic concepts of base solution, logistics system methodology management of technical risks and logistic system analysis of the machinery.

KEY WORDS

logistics risk
safety program
risk management
machinery analysis

Sažetak

Članak se bavi logistikom i rizikom menadžmenta sigurnosnog programa novih i renovinarih strojeva s kojima se moramo baviti kao članovi menadžmenta kompanije. Postoje razjašnjive posljedice netretiranih rizika koje mogu zaustaviti opasan događaj. U ovom slučaju, šteta može biti život ili zdravlje korisnika ili može stvoriti štetu na njihovoj imovini t.j. može završiti kao šteta na stroju. Doprinos iz vlastite perspektive je usredotočen na: definiranje bazičnih koncepata osnovnih rješavanja problema, menadžment tehničkih rizika i analiza logističkog sustava strojeva

KLJUČNE RIJEČI

logistički rizik
program sigurnosti
menadžment rizika
analiza strojeva

1. INTRODUCTION

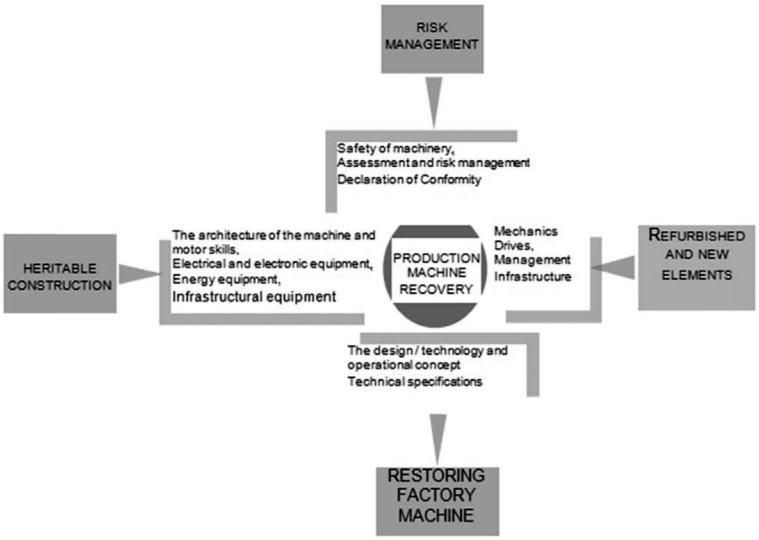
Design, manufacture, install and make operational the renovated manufacturing machine is a very difficult feat that requires parallel actions in three areas (Figure. 1). The first is the construction of hereditary mechanical parts, electrical wiring and supply of media to another, then renovated and new construction machinery parts, energy and information devices, especially in terms of design and technology links, and then to the third risk management, which aims to ensure meet all legislative requirements placed on the safety of the reconstructed machine. These three areas are irreplaceable whole. It is a complex issue so that teamwork is essential in the design and process engineering [1-4].

The following considerations are based on [5-7]. The present knowledge of the experts involved in the detection of security in various fields are undoubtedly prove, that all processes in the real world are burdened with certain risks - the risk to an insignificant risk intolerable. The purposes of risk management is a systematic search of the risks associated with specific processes, analyzing the risks identified and their complete elimination, or at least reduce the level of marginal risk selection and implementation of appropriate security and safeguards.

2. THE ESSENCE OF MANAGEMENT OF TECHNICAL RISKS

The essence of management of technical risks is based on the knowledge that all processes in the real world are burdened with certain risks - the risk to an insignificant risk intolerable. The purposes of risk management is a systematic search of the risks associated with specific processes, analyzing the risks identified and their complete elimination, or at least reduce the level of marginal risk selection and implementation of appropriate security and safeguards.

The most frequent and significant elements of risk management are also verifying the effectiveness of protective measures and learning from mistakes. In terms of security risk management strategy puts emphasis on a consistent preference for risk prevention and security measures intended purpose is primarily to identify and remove as many sources of danger or



Source: authors

Figure 1 The areas involved in the recovery process of the production machine

hazard already at the stage of conceptual design process, before protective measures designed to only reduce the risk that is due to avoidable hazards.

Only by adhering to safety regulations' relating to specific processes is in terms of risk management is inadequate, since it is confined only to reduce existing risks through protective measures. It is necessary to increase fault tolerance by reducing the probability of creating a safety margin, which can be understood as a safety feature.

According to ISO / DIS 31000 [4] risk management process involves the application of logical and systematic steps. Risk management is here defined as the systematic application of policies, procedures and techniques of management roles dealing with the determination of the context, detection, analysis, evaluation, assessment, treatment, monitoring and communicating risks to them in a way that allows the organization to minimize losses and maximize the opportunities of cost effective manner. To achieve maximum benefit, it is necessary to risk management activities (hazard identification, risk assessment, treatment risks, monitoring risks ...) can be initiated in the first stage of the project and continue to risk management in all other stages.

For security of production machines cannot see the risk of a chance to succeed. Such an approach would be simply unacceptable health hazard as the lives of users of these devices, as well as prosperity of the company, which would be dangerous machines launched or in operation. Described above a general risk management is therefore not absolutely applied to detect the safety of production costs and needs to be modified in such a way to answer legislative requirements with regard to safety of machinery and therefore the relevant harmonized standards relating to safety of machinery.

All activities associated with the development of new and refurbished production machine, ensuring the quality, safety, hygiene and ecology are associated with larger or smaller risks. The task of management of technical risks is time to identify all the hazards, assess (evaluate) the associated risk (i.e. risk levels deriving from machine design, management, establishment, maintenance, operation, liquidation, etc.).

And, if appropriate, develop and implement remedial measures to risk reduction. Figure 2 presents the broad scope of management of technical risks. The most important areas of technical risk management is ensuring the safety of machinery in terms of their structure and behavior throughout their life cycle and further ensure the functional safety of control systems (electronic, pneumatic, hydraulic).

Quality management systems are useful in demonstrating how the parameters are identical for all products of similar type to the enterprise in production, so the general management of risks during the provision of product development in terms of fulfilling the particular rogue and the customer wishes.

Environmental management systems then find their application in solving parsimony requirements throughout the life cycle of machinery for the environment [5, 15], [7], [8-10].

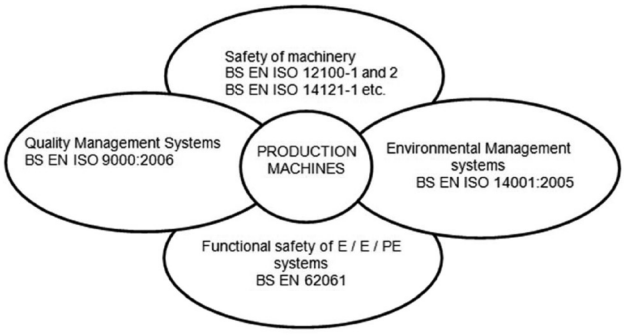


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Figure 2 Spectrum management of technical risks

The risk is necessary in the management of technical risks seen as a threat to peace, which is determined by a combination of importance (severity of) potential damage and the likelihood of damage.

3. SYSTEM METHODOLOGY MANAGEMENT OF TECHNICAL RISKS IN THE MANUFACTURING MACHINE

System methodology management of technical risks in the manufacturing machine is based on standard methods and quality assurance tools and production machines such modifies

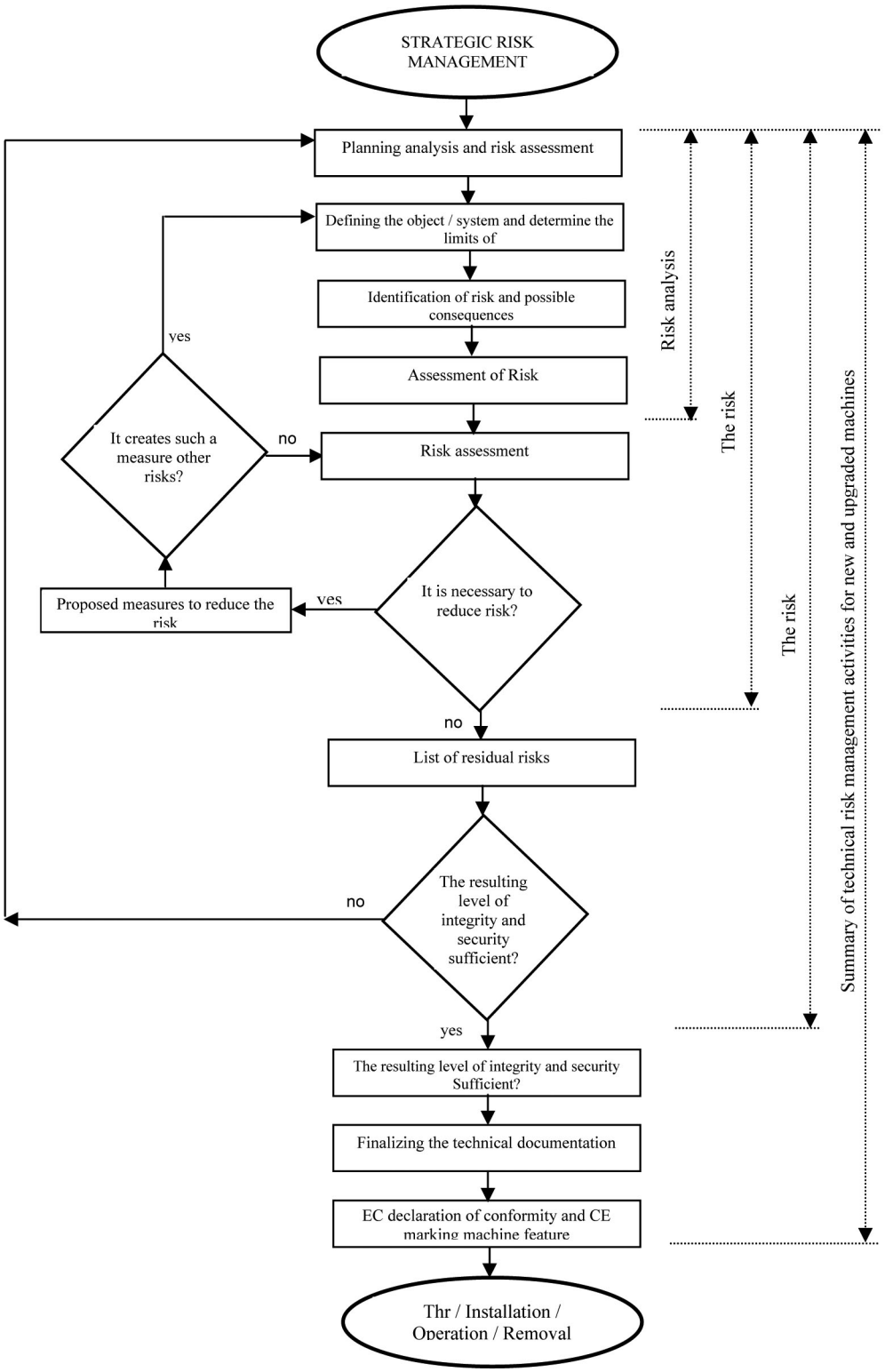

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Figure 3 Flow chart of management of technical risks in new and upgraded production machines

It belongs to a sequence of activities necessary to achieve the security machinery.

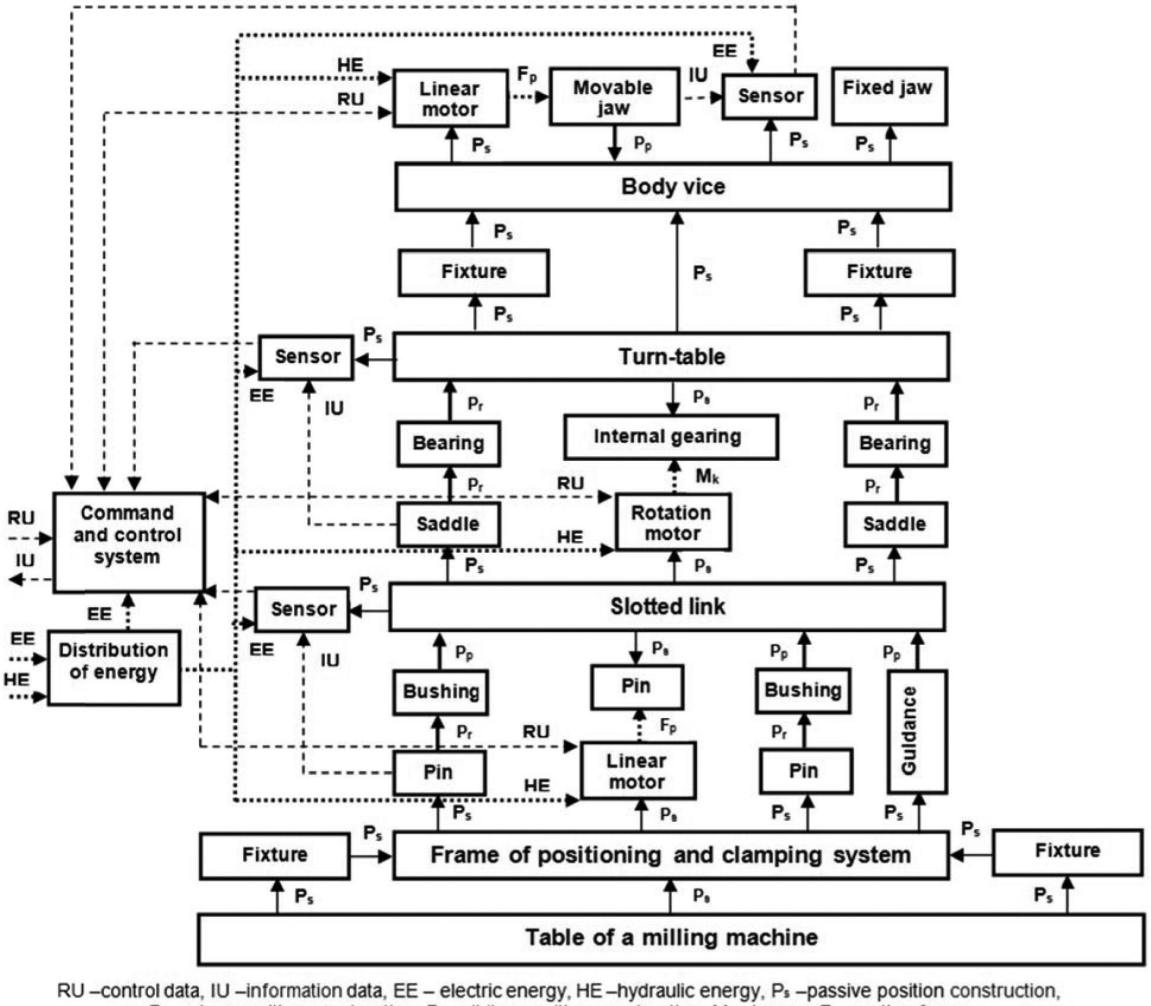
The overall approach to managing technical risks in the manufacturing machinery is clearly shown by the flowcharts in Figure 3.

It is divided into the following steps [5], [7,16], [9-13]:

1. Strategic risk management. Perceptions of policy and risk management by senior management and the relevant directives should be drawn up and agreed upon by experts especially for the implementation of operational risk management.
2. Planning analysis and risk assessment. Prior to the analysis of the risks created by the planning done.
3. System analysis machinery. For the purpose of hazard identification and risk assessment is important to understand the basic concept and principle of the machine.
4. Determine the limits of the machinery. Then what we have on the block diagram describes the principle and function

of the production machine is necessary to determine the extent of risk analysis (eg. inclusion of process hazards, environmental hazards or external effects in the hazard analysis).

5. Identification of significant hazards. The machinery is made in accordance with the Slovak and European technical standards EN ISO 14121-1 [5] EN ISO 12100-1 and EN ISO 12100-2 [4], and the entire life cycle of the machine. This means that the identified relevant dangerousness fixed during system analysis add further machinery similarly identified hazards generated during all phases of the life cycle of the machine and selecting the most important (serious) hazards that need to implement risk reducing measures.
6. A risk assessment. Estimate the size of the risk should be done by graph to estimate the risk for all identified significant risks included in the "Overview of identified significant hazards" [2]. If these risks occur in several places of machinery, it is necessary to carry out a risk assessment for all the places of their occurrence in separate forms. First, take an initial assessment of risk to the level of risk, which occurs in machinery if they are not used any preventive action to reduce this risk. The risk for machinery remains even after taking all possible precautionary measures, called residual risk.
7. Risk Assessment. This step is Necessary to Decide Whether a risk is found acceptable. For this decision, we can use pre-defined boundaries of acceptability of risk. If the level of risk is Unacceptable to Propose action to reduce this risk. If the level of risk is acceptable approaches to risk assessment is another important risk.
8. Proposal for action to reduce risk. If unacceptable risks to propose preventive measures to reduce to acceptable levels. Such measures are mainly structural, technical and safety risk mitigation measures (including members warning the user). To increase transparency, documentation, technical risk management process should be shown a detailed verbal description of preventive measures.
9. List of residual risks. After each implementation of risk reduction is again made its assessment. If there is no significant additional risk to unacceptable levels of risk are concerned, the summary results of the assessment process and risk reduction, summarize the information on identified risks and create a so-called. List of residual risks. List of residual risks is an important output of the assessment process and risk reduction. It is important for assessing the safety of the resulting machine company management and user information required for the production of the machine with the persistent dangers of residual risk.



RU –control data, IU –information data, EE – electric energy, HE –hydraulic energy, P_s –passive position construction, P_r –rotary position construction, P_p –sliding position construction, M_k –torque, F_p –motion force

Source: authors

Figure 4 Block diagram of the reconstructed part of the tool machine

10. The level of integrity and security of the resulting machine. The integrity of safety is the likelihood that the machine system or subsystems perform the required performance (working) function is completely safe for all specified conditions. Integrity also implies that the safety integrity of safety management (hardware, software) as well as structural integrity of the safety management system and resistance to systemic failure, i.e. such a disorder, which clearly caused by a specific cause can be eliminated by modifying the design, production or operational procedures and the like. (the systematic safety integrity).
11. List the measures taken. For greater transparency and control the results of the assessment process and risk reduction should be taken to draw up a table with a transparent reference to the number of significant risks that this measure decreases.
12. Finalizing the technical documentation of the production machine. At this stage, risk management, provide complete technical documentation of the production machine (within the meaning of Directive 2006/42/EC), which was within the risk management continually refine and complete the course.
13. An EC declaration of conformity and marking machine manufacturing CE mark. The last step in the process of assessing and reducing risk of exposure to the EC declaration of conformity to the requirements of current applicable legislation.

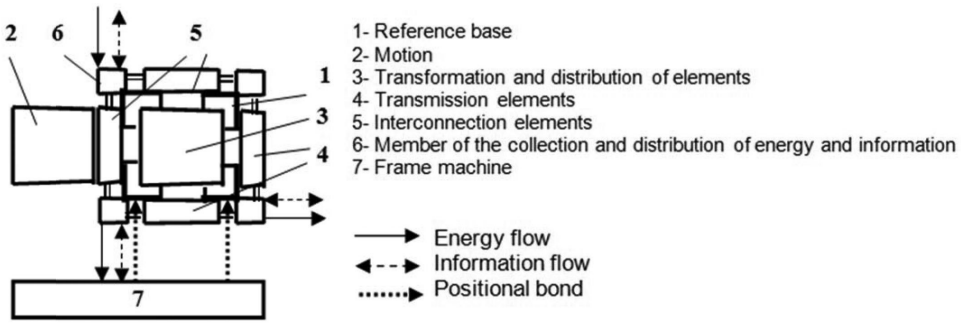
In completing the assessment process and risk reduction equipment manufacturing machine is CE mark (Conformité Européenne from France) before being placed on the market or put into service.

4. SYSTEM ANALYSIS MACHINERY

For the purpose of hazard identification and risk assessment is important to understand the basic concept and principle of the machine under consideration by the next phases of activities [7], [8], [10-12]:

- creating a block diagram of the production machine. Block diagram (Figure 4) of the machinery is such a diagram, where is the appropriate level of representation show the distinctive logical construction of machinery (functional and structural connections of individual components) and its any significant interaction of particular elements.
- identify the relevant hazards associated with construction of the production machine. Using the block diagram of machinery (Figure 5) and standards EN 12100-1 to provide all the relevant (existing) risks associated with the design of the machine;
- determine hazardous areas of machine manufacturing (Table 1). In response to identified relevant hazards associated with machine design and the intended layout and cover of the machine using the block diagram of the tool machine selected main danger areas of machine. Various hazards in these dangerous areas are usually provided with a common preventive measure to reduce risk.

In Table 1, it is provided examples of documentation of relevant hazards associated with construction of the machine. In the column "Location component in the system" states the dangerous area in which the component occurs. In the column "type of danger" is provided calculation of the relevant hazards according to EN ISO 14121-1.



Source: authors

Figure 5 Block diagram of the reconstructed 2D motion module

Table 1 Documentation of sources of hazards relevant to the tool machine

Name of the machine component	Position of the component in the system	Type – source of hazards
Linear actuator	Spherical unit	Mechanical / jam, press, cut, wound, capture or retraction – the moving parts. Electrical – overload, short circuit, the live parts, electrical phenomena. Heat – alignment, friction, lubrication and cooling, working conditions and environmental conditions. Hazards generated by noise – static and dynamic stiffness, systematic and random variation, wear. Unexpected start – incompetence, inattention, another person. Unexpected speeding overrun – design and information ensuring.
	Chucking unit	
Rotary actuator	Rotating unit	
Transformation and distribution of elements	Spherical unit – Rotating unit	
	Chucking unit	
Transmission elements	Rotating unit	
	Chucking unit	
Interconnection elements	Spherical unit – Rotating unit	
	Rotating unit – Chucking unit	
Member of the collection and distribution of energy and information	Spherical unit – Rotating unit – Chucking unit	

Source: authors

5. CONCLUSION

The proposed modified risk management of new machines, which is based on the general principles of risk management and systemic risk assessment methodology, clearly highlights the important role of corporate management in the overall assessment process and risk reduction. Successful security solution developed by the machine is in any case cannot be made without the support of top management of the company to be enough to perceive the importance of this process and create favourable conditions for its implementation [5], [11-14].

The lack of or inappropriate management of the risks of new machines will just lead the company responsible for the consequences of untreated enough risks that may stop a dangerous event. Damage in this case can be life or health of users or it can create damage to their property i.e. that may end up as damage the machine.

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