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<https://doi.org/10.23947/2541-9129-2019-4-9-12>**LEAN PRODUCTION TECHNOLOGY AS
AN ELEMENT OF THE PROFESSIONAL
RISK MANAGEMENT SYSTEM OF THE
ENTERPRISE***Maslenskiy V. V.*Don state technical University, Rostov-on-Don,
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The article describes the methods of production management, providing, in addition to improving productivity, the normalization of harmful and dangerous factors of the working environment. By results of comparison of the main indicators of individual professional risk of the worker the interrelation between improvement of working conditions and introduction of lean production in foundry is proved. The conclusion is made about the efficiency of lean production methods in terms of professional risk management.

Keywords: lean production, PRMS, individual professional risk

Introduction. In recent years, the term "lean production" has become increasingly common in the Russian Federation, covering various types of economic activities. Initially, the Japanese company Toyota used the methods of lean production in the automotive industry, which subsequently gave it the opportunity to compete with American automakers. Based on the experience of Toyota, industrialized countries began to create their own concepts, applying them not only in the automotive industry, but also in trade and services.

The high competitiveness of enterprises using the methods of lean production is explained, first of all, by the economy of resources, which can be achieved by reducing or completely eliminating losses. Losses are any activity that does not bring value to the consumer. The creator of the technology of lean production, Taiichi Ohno, revealed three types of losses:

- *múda* — losses occurring in the production process (for example, due to unsatisfactory condition of the equipment, errors in calculations, etc.);
- *múra* — losses arising from the violation of the production schedule;
- *múri* — losses associated with the impact of unfavorable production environment on workers and equipment [1]. The exclusion of this type of losses is one of the main tools of professional risks management system (PRMS) of the enterprise. Thus, lean production and PRMS partly pursue the same goals. The task of the author of this article is to conduct a comparative analysis of the indicators of individual

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ПРОИЗВОДСТВА КАК
ЭЛЕМЕНТ СИСТЕМЫ УПРАВЛЕНИЯ
ПРОФЕССИОНАЛЬНЫМИ РИСКАМИ
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Описаны методы управления производством, обеспечивающие, помимо повышения производительности, нормализацию вредных и опасных факторов производственной среды. По результатам сравнения основных показателей индивидуального профессионального риска работника доказана взаимосвязь между улучшением условий труда и внедрением бережливого производства в литейном цехе. Сделан вывод об эффективности методов бережливого производства с точки зрения управления профессиональными рисками.

Ключевые слова: бережливое производство, СУПР, индивидуальный профессиональный риск.

occupational risk before and after the introduction of lean production methods in the foundry and find out how effective they are as an element of PRMS.

Methods of lean production from the point of view of professional risk management. To date, a huge number of methods of lean production have been developed, but most of them are aimed at increasing the value of products. From the position of professional riskology, the following may be the most effective:

- 5S system — keeping the workplace clean and tidy;
- TPM system (Total Productive Maintenance) — maintenance of equipment, ensuring product quality and compliance with safety requirements, elimination of harmful effects on workers;
- SMED system (Single Minute Exchange of Dies) — achievement of operational efficiency at replacement of tools of the equipment;
- Kaizen system — continuous improvement [2].

Lean production implementation experience. The methods of lean production described above have found their application at one of the machine-building enterprises of the Rostov region — ООО "PK "NEVZ", Novocherkassk. The technology Foscon, based on the use of cold-hardening mixture for molds and rods (Fig. 1) was introduced in the foundry, where there was an extremely unfavorable technogenic situation in 2011. To obtain a cold-hardening mixture, a safer SMAZOS mixer was introduced into operation.

The advantages of this technology and equipment were:

- minimization of emissions of harmful substances into the air of the working area;
- reduction of dust emission during transportation of materials and mold knockout;
- saving more than 50% of molding mixtures due to their re-application.



Fig. 1. Part of Foscon-process

The introduction of Foscon technology allowed them to achieve not only the improvement of working conditions in the foundry, but also the reduction of industrial injuries and occupational morbidity among workers. Thus, from 2005 to 2010, the labor protection service of ООО "PK "NEVZ" registered

22 accidents and 39 cases of occupational diseases, and from 2013 to 2018 — a total of 9 accidents and 6 cases of occupational diseases (table. 1-2) [3-6].

Table 1

Statistics on industrial injuries, professional morbidity in the foundry before the introduction of lean production (2005-2010)

	2005	2006	2007	2008	2009	2010
Number of accidents	7	5	3	2	3	2
Number of professional diseases	-	25	10	4	-	-

Table 2

Statistics on industrial injuries, professional morbidity in the foundry after the introduction of lean production (2013-2018)

	2013	2014	2015	2016	2017	2018
Number of accidents	4	-	2	2	1	-
Number of professional diseases	3	3	-	-	-	-

The impact of lean production on occupational risk. Work [7] analyzes the working conditions before and after the introduction of lean production methods according to the basic indicators of individual professional risk (Hf, NV, IEWC, IPR) on the example of foundry professional group. Fig. 2. shows the results of the analysis.

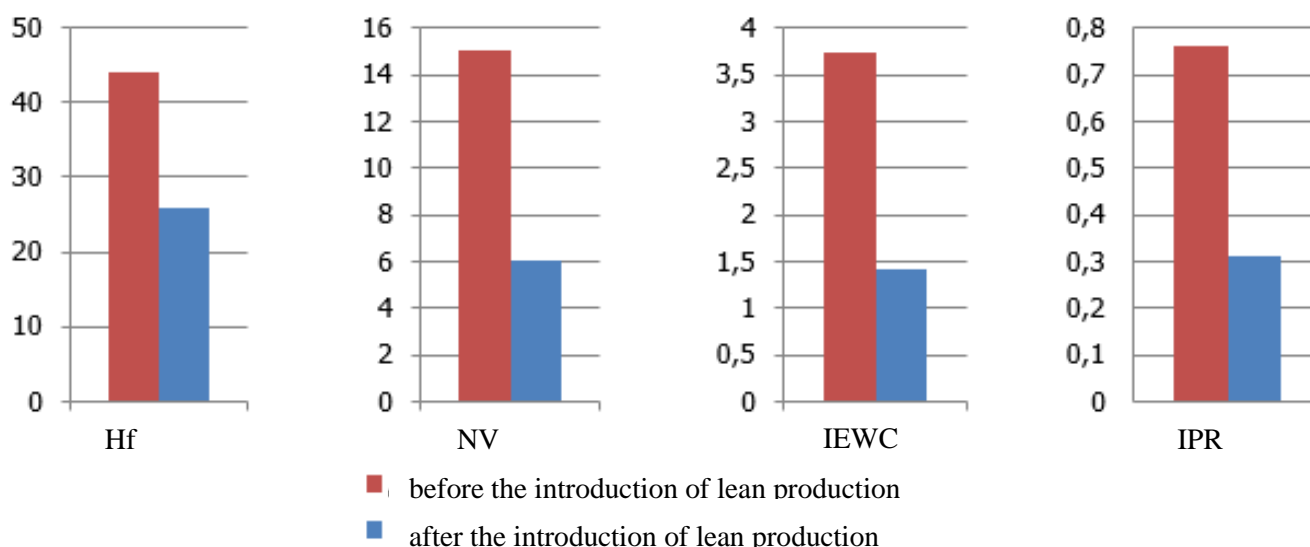


Fig. 2. Comparison of the main indicators of individual professional risk

Conclusion. Based on the comparative analysis of the main indicators of individual professional risk before and after the introduction of lean production methods in the foundry and data on industrial injury and occupational morbidity during this period, conclusions were made indicating the effectiveness of lean production methods as an element of the PRMS:

— the number of accidents decreased by 2.4 times, the number of cases of occupational diseases - by 6.5 times;

— the individual professional risk of the employee decreased by 2.5 times, the indicators of Hf, NV, IEWC — by 1.7, 2.5 and 2.7 times, respectively.

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