2. Patra, A. RAMS and LCC in Rail Track Maintenance, Division of Operation and Maintenance Engineering, Lulea University of Technology, 2009.

3. ГОСТ Р 54505–2011. Безопасность функциональная. Управление рисками на железнодорожном транспорте.

4. Шубинский И. Б. Структурная надежность информационных систем. Методы анализа // Журнал «Надежность», 2012.

5. Шубинский И. Б. Функциональная надежность информационных систем. Методы анализа // Журнал «Надежность», 2012. ●

## RESULTS OF IMPLEMENTATION OF THE PROJECT OF INTEGRATED MANAGEMENT OF RESOURCES, RISKS, RELIABILITY ANALYSIS AT ALL THE STAGES OF LIFE-CYCLE (URRAN)

***Zamyshliaev, Alexey M.*** *– Ph.D. (Tech), head of research and technical commission on the traffic safety systems and automation of railway station processes of Research & Design Institute for Information Technology, Signalling and Telecommunications on Railway Transport (JSC NIIAS), a branch company of JSC Russian Railways, Moscow, Russia.*

*The system of Integrated Management of Resources, Risks, Reliability Analysis at all the Stages of Life-Cycle (the short name URRAN is due to abbreviation of Russian spelled project title) has been developed by Research & Design Institute for Information Technology, Signalling and Telecommunications on Railway Transport (JSC NIIAS) in cooperation with its parent company JSC Russian Railways and other partners in order to create a modern technology of support of decision-making in the sphere of reliability and operation safety of railways. The project implementation started in 2010 at the Severnaya (Northern) railway, a regional subsidiary to JSC Russian Railways, under the coordination of Russian Railways senior vice-president Valentine Gapanovich. The previous researches were held by JSC NIIAS together with the officials of different functional divisions of Russian Railways particularly representing track, signalling and interlocker, automatic devices and teleautomatics, electrification and power supply divisions.*

*Testings of intermediary and final results of researches were organized at 261 stations, 288 stages, 29 permanent way divisions, as well as at different teleautomatics, electrification and power supply divisions. More than 3200 km of tracks were used for testing during 22 months.*

*The track divisions were tested in order to assess the quality of operations in conformity with URRAN indices, which go beyond the statistics of failures. The results and conclusions of assessments with URRAN methods are shown on the charts.*

*The teleautomatics divisions tested URRAN system by assessing reliability of automatic devices. The system allows identifying the devices with reliability indices below primarily designed and even allowed levels. The same tests were held in electrification and power supply division to verify aerial contact network.*

*The risk management segment was aimed at creating national standard «Functional safety. Risk management at railways», at staff and workforce training, at exact assessment of actual risks like violation by pedestrians of the rules of track crossing, at engineering of the processes of interaction of different corporate divisions.*

*Traditionally the repairs of track infrastructure are scheduled in conformity with initially determined terms and periods of operation regardless of the actual conditions. The resources segment of the URRAN system is engineered from behalf another approach that permits to save important resources. Major repairs are held when the track achieves a «limit» condition. To assess the rate of «limit» condition the system evaluates the risks of traffic safety violations (depending on the aspects, specific for every railway technical division).*

*The URRAN testing implementation has resulted in considerable reduction of track maintenance costs. For instance the major repairs are held at the track divisions where rails can still be used, if one sees standard period of exploitation, but where current operational costs are higher than the critical rates of economic criterion.*

*The URRAN system gives the possibility to determine the track divisions which need repairs the most and to rationally distribute financial resources, to assess the risks of accidents at given divisions, ensure safety control even if the information is incomplete.*

**Key words: railway, resources management, risk management, reliability management, safety, project, research, results**

## REFERENCES

1. Patra, A. Maintenance Decision Support Models for Railway Infrastructure using RAMS & LCC Analyses, Division of Operation and Maintenance Engineering, Lulea University of Technology, 2007.

2. Patra, A. RAMS and LCC in Rail Track Maintenance, Division of Operation and Maintenance Engineering, Lulea University of Technology, 2009.

3. State Standard R 54505–2011. Functional Safety. Risk Management at Railways.

4. Shubinsky, I. B. Structural Reliability of Information Systems. Methods of Analysis [*Strukturnaya nadezhnost informatsionnyh system. Metody analiza*]. *«Journal Nadezhnost» LLC*, 2012.

5. Shubinsky, I. B. Functional Reliability of Information Systems. Methods of Analysis [*Funktsionalnaya nadezhnost informtsionnyh system. Metody analiza*]. *«Journal Nadezhnost» LLC*, 2012.

Координаты автора (contact information): Замышляев А. М. (Zamyshliaev, Alexey M.) – a.zamyshlaev@gismps.ru.

*Статья поступила в редакцию / received 10.10.2012*
*Принята к публикации / accepted 23.11.2012*