ЛОГІСТИКА ТА ТРАНСПОРТ

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RISKS AND HAZARDS OF RAIL TRANSPORTATION SYSTEMS

The regulation defines a hazard as «a condition that could lead to an accident» [3, p. 9].

The Safety Directive defines an accident as: «accident» means an unwanted or unintended sudden event or a specific chain of such events which have harmful consequences; accidents are divided into the following categories: collisions, derailments, level-crossing accidents, accidents to persons caused by rolling stock in motion, fires and others.

«Serious accident» means any train collision or derailment of trains, resulting in the death of at least one person or serious injuries to five or more persons or extensive damage to rolling stock, the infrastructure or the environment, and any other similar accident with an obvious impact on railway safety regulation or the management of safety; 'extensive damage' means damage that can immediately be assessed by the investigating body to cost at least EUR 2 million in total (Directive 2001/14/EC) [1].

Therefore, a hazard is a condition that could lead to harm to people, assets or the environment.

Risk is a probability or threat of damage, injury, liability, loss, or any other negative occurrence that is caused by external or internal vulnerabilities, and that may be avoided through preemptive action.

Incidents involving transport systems – rail General hazards associated with carriages and freight include [2, p. 9]:

- size;
- speed;
- weight;
- materials of construction (e.g. asbestos, wood, aluminium, toughened glass);
- open wide gangways in passenger carriages allowing combustion and contaminants to spread freely;
- liquefied petroleum gas/diesel/steam used for various purposes including heating, fuel and cleaning;
- high pressure fluids as components of the vehicle's safety and running systems;
- hazardous materials and freight including explosives, radioactive or irradiated materials;

• multi load of hazardous and non-hazardous materials;

• on board electrical system, for example, air conditioning units;

• technical and maintenance equipment including grinding, laser and isotope equipment carried on a range of specialist vehicles for railway maintenance;

• passengers.

According to the Summary of Generic Risk Assessment 4.2 such railway activities may be associated with such risks as fatality, major injury, delay in delivery of service resulting in increased risk of injury or death, serious injury and infection, incident escalation, environmental damage:

Operations involving rail network and rolling stock – Inadequate preparedness for operational type.

1. Attendance at incidents involving rail network and rolling stock.
2. Gaining access to rail system at controlled entry points (e.g. stations and termini).
3. Gaining access to rail system in remote or uncontrolled locations.
4. Establishing safe scene of operations.
5. Management of isolating traction current and earthing of OLE.
6. Search and rescue including extrication activities.
7. Evacuation of public from scene of operations.
8. Firefighting.
9. Control of hazardous materials, environmental protection.
10. Reinstatement and post-incident actions.

As accidents on railways are rare, the monitoring of events with less serious consequences occurring on railways is a vital part of proactive safety management. The «Precursors to accidents» collected within the CSIs (also known as near-misses or close-calls) are indicators of incidents that under other circumstances could have led to an accident.

Over the period 2012–2014, EU countries reported more than 10 000 precursors to accidents per year as defined under CSIs; this is a ratio of up to five precursors to one significant accident. However, if we discard accidents to persons caused by rolling stock in motion, the ratio between the precursors and accidents rises to 9:1. This reveals the great potential benefit in analyzing precursors in the proactive monitoring of railway safety [4, p. 38]. In figure 1 are shown Accident precursors.

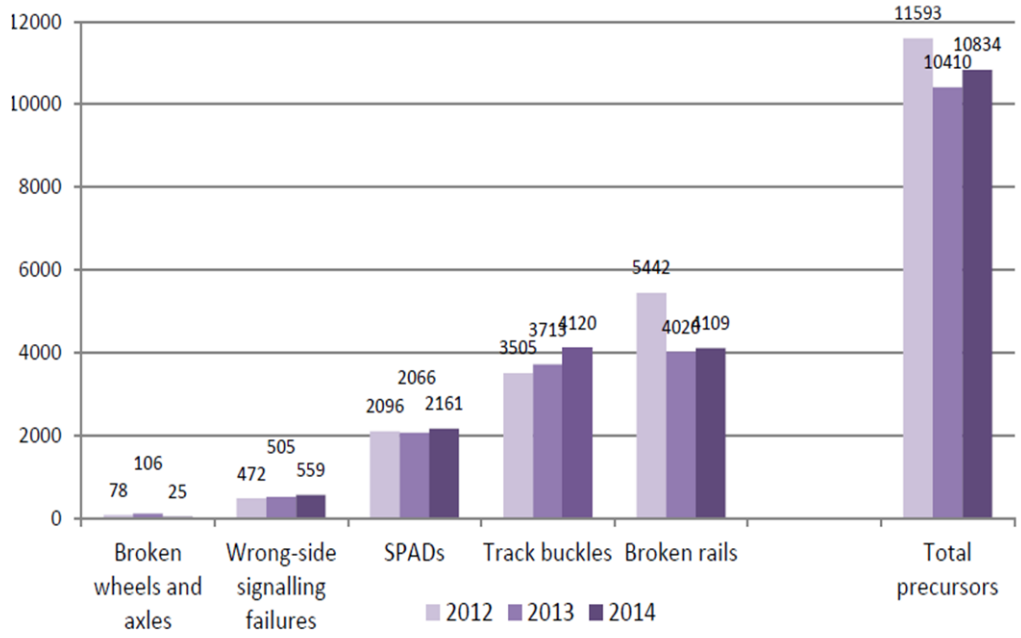

Fig. 1. Accident precursors

References:

1. Directive 2001/14/Ec Of The European Parliament And Of The Council of 26 February 2001 on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure and safety certification [Electronic resource] – Access to resource: http://eur-lex.europa.eu/lexuriserv/lexuriserv.do?Uri=OJ:L:2001:075:0029:0046:EN:PDF.

2. Fire and Rescue Service – Operational Guidance – GRA 4.2 [Electronic resource] – Access to resource: http://www.ukfrs.com/Legacy.

3. GE/GN8642 Guidance on Hazard Identification and Classification Part 3 Guidance on Hazard Identification [Electronic resource] – Access to resource: https://www.rssb.co.uk/rgs/standards/GEGN8642%20Iss%202.pdf.

4. Railway Safety Performance in the European Union (2016) European Union Agency for Railway [Electronic resource] – Access to resource: http://www.era.europa.eu.