

## Task 02/A1.1

# NATIONAL STATICAL DATA RELATED TO ACCIDENTS IN THE CONSTRUCTION AND FACTORIES SECTOR FOR EACH PARTICIPATING COUNTRY- POLAND



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## 1. INTRODUCTION

In this Intellectual Output 2, the key situations will be proposed to be included in the 3D environments. As we have indicated in the aims of the work package the key situations will be based on previous reports, taking into account the main risk situations in robotic construction companies and the application of health and environmental prevention measures currently applied in this sector. These situations will be sent to all partners who will comment any addition or change that should be done.

The main objective of this report of the subtask O2/A1.2 is to develop a comparative study in constructions sites and factories using robotised or automated equipment in each participant country, in order to define the main risk situations to be implemented in the SafeCrobot learning tool.

## 2. INFORMATION COLLECTED

83,205 people were injured in accidents at work in 2019 (by 1.3% fewer than in 2018), including 184 persons injured in fatal accidents (by 12.8% fewer) and 396 in serious accidents (by 24.9% fewer).

The most people injured in accidents at work were recorded in units classified in the section manufacturing (28 121 accidents), trade (10 492 accidents), human health and social work activities (9 024 accidents), construction (4 743 accidents).

In the breakdown by type of economic activity, the highest incidence rate was recorded in the sections: mining and quarrying (17.34), water supply; sewerage, waste management and remediation activities (14.09), manufacturing (9.96) and construction (5.70).

In 2019, the most victims of accidents at work were recorded among persons working as stationary plant and machine operators (10.7% of all victims) and metal, machinery and related trades workers (10.4% of all victims). The most fatal accidents were recorded in the group of building and related trades workers (excluding electricians) – 17.9%

### 2.1. Accident statistics in factories

According to the Polish Labor Code, the employer is obliged to immediately notify the competent regional labor inspector and prosecutor of a fatal, serious or collective accident at work and of any other accident that caused these effects in connection with work, if it can be considered an accident at work. There is no such obligation in the event of a light accident. The employer is also obliged to prepare the Statistical Accident Card and send it to the Central Statistical Office in Poland.

The statistical data on accidents at work in factories (and also in construction site) are published in annual reports of the Central Statistical Office in Poland. The online version is available via the link:

<https://stat.gov.pl/en/topics/labour-market/working-conditions-accidents-at-work/accidents-at-work-in-2019,3,13.html>

The sample statistical data are presented in the tables below.

Persons injured in accidents at work in <u>construction section</u>							
Year	total		of total number			days lost	
			in accidents				
	in absolute numbers	in %	fatal	serious	with other effect	in absolute numbers	per 1 person injured
2018	5,247	6.2	48	85	5,114	281,103	54.1
2019	4,743	5.7	44	41	4,658	256,952	54.6

Persons injured in accidents at work in <u>construction</u> in 2019		
Specification: a – total; b – of whom in fatal accidents; c – of whom in serious accidents		
Building and Related Trades Workers (excluding Electricians)	a	1,919
	b	20
	c	18
Metal, Machinery and Related Trades Workers	a	457
	b	4
	c	1
Assemblers	a	55
	b	1
	c	1
Drivers and Mobile Plant Operators	a	457
	b	2
	c	5

The scope of the reports in relation to robotised and automated equipment used in Polish construction industry is included in point 2.2.

## 2.2. Accident statistics in construction site

According to the adopted European Statistics on Accidents at Work (ESAW) Methodology, developed by the Statistical Office of the European Union (Eurostat), the data published by the Central Statistical Office in Poland do not distinguish robotised and automated equipment.

<https://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/KS-RA-12-102>

The data published by the Central Statistical Office in Poland relate to fatal, severe and light accidents.

Among the specific physical activity performed by the victim at the time of the accident, there is the physical activity like "operating machines" or "driving/being on board of a means of transport or handling equipment" but these are very general statements, relating to the whole of all machinery and equipment used in the construction.

Persons injured in accidents at work in <u>construction</u> by specific physical activities performed by the victim at the time of the accident in 2019									
Specification: a –total b – of whom in fatal accidents c –of whom in serious accidents	Total	Specific physical activity performed by the victim at the time of the accident							
		operating machines	working with handheld tools	driving/being on board of a means	handling of objects	carrying by hand	movement	presence	others
a	4,743	287	904	239	921	739	1,538	114	1
b	44	4	2	9	5	-	18	6	-
c	41	10	4	3	9	4	9	2	-

The same applies to the deviation causing accidents at work for which there is "loss of control of machine, means of transport or handling equipment, hand-held tool, object, animal", but without further division / listing.

The "material agent" may be:

- machine and equipment – portable or mobile,
- machine and equipment – fixed,
- conveying, transport and storage system,
- land vehicles,
- material, object, product, machine or vehicle components, debris, dust,

but again it is also a very general concept. Under the word "machines" there are both traditional / classic equipments used in construction, as well as innovative equipments, such as robotised and automated equipments.

Material agent associated with the specific physical activity performed by the victim at the time of the accident by specific physical activity in 2019 in all sectors									
Specification	Total	Specific physical activity performed by the victim at the time of the accident							
		operating machines	working with hand--held tools	driving/being on board of a means of transport or handling equipment	handling of objects	carrying by hand	movement	presence	others
Machines and equipment - portable or mobile	1,226	287	96	139	229	168	266	41	-
Machines and equipment - fixed	6,876	4,181	591	68	1,177	285	509	65	-
Conveying, transport and storage systems	7,932	603	203	1,566	1,474	2511	1391	184	-
Land vehicles	5,396	93	87	2,777	403	236	1617	183	-
Materials, objects, products, machine or vehicle components, debris, dust	13,909	1,137	835	198	4,359	5489	1672	219	-

Besides, there are known general data concerning the drones used in Poland. The European Central Repository (ECR) data show that in Poland, both in 2016 and 2017, there were no accidents or serious incidents involving drones. At the same time, 28 incidents were recorded during this period, as shown in figure 1 below.

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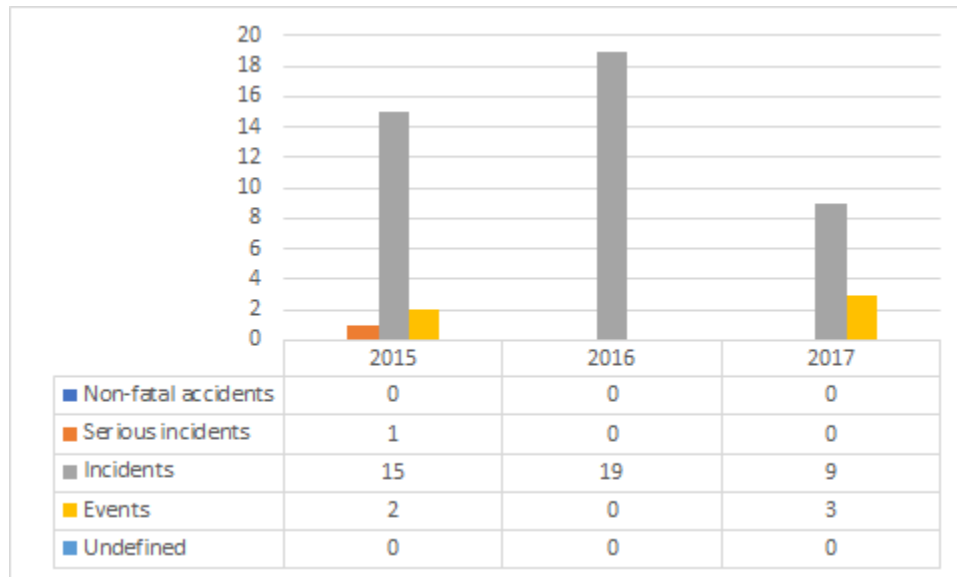


Figure 1. Events involving drones in Poland [data for 2015-2017]

### 3. CONCLUSIONS OF COMPILED DATA

The construction industry is one of the most accident-susceptible sectors of the national economy and is characterized by a high rate of accidentality. The analysis of statistical data on accidents in factories (2.1) and in construction site (2.2), due to the lack of data, did not indicate the most common risks associated with the use of robotised and automated equipment in Polish construction industry.

The literature review (2.3) showed that the robotised and automated equipment used in Polish construction include, among others earthwork machines, drones, 3D printers, demolition robots.

Only 6 of 39 papers (15%) take into account or deal with hazards related to the use of robotised and automated equipment. In the Polish literature, the papers mainly emphasize the presentation (description) of the applied innovative solutions (in a very general way) or legal regulations. Information about the risks have been discussed only for drones used in construction and demolition equipment.

And so, the use of drones in the construction may cause the following risks:

- possible collision with another the unmanned aerial vehicles,
- failure of a single navigation system,
- damage to the drone, need to stop the flight,
- traffic accidents involving drones (e.g. collisions with a car, with a low-flying plane, entanglement of a drone in the high-voltage grid),
- unforeseen breakdowns.

In turn, the use of equipment for demolition may experience the following risks:

- robot overturning - crushing the controller,
- loss of stability, despite extended supports, when the operating arm is fully extended,
- falling into a trench while working on the edge of the trench,
- eye injuries caused by dust,
- impacts caused by falling objects, construction elements,
- noise damage to the ear,
- risk of loss of stability and cases of faulty machine operation,
- risk of machine failure,
- causes of arm fractures: stress build-up, resonance,
- eye injuries caused by dust,
- impacts caused by falling objects, construction elements,
- noise damage to the ear.