HEALTH AND SAFETY RISK ASSESSMENT FOR THREE REPRESENTATIVE WORKSTATIONS FROM A LOCAL COMPANY THAT MANUFACTURES ELECTRICAL LIGHTING EQUIPMENT

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Abstract: In the current context of accelerated developments towards a VUCA (Volatile-Uncertain-Complex and Ambiguous) world, more and more industrial companies are trying to adjust their management systems and associated procedures from the perspective of an effective - but always perfectible - risk management for the business, including here the quality, safety, security, financial risks and more. Attempts to optimize industrial and occupational safety are based on the basic principle of risk assessment and - from this perspective - this article presents the procedure applied and the results obtained in a systematic process of assessing the risks of occupational accidents for workplaces within a local company that manufactures electrical lighting equipment. The results obtained were the prerequisites for establishing the measures to minimize the identified and ranked risks, thus substantiating the prevention and protection plan of the investigated company, in accordance with the provisions of the national legislation in force.

Key words: electrical equipment manufacturing, accident at work, occupational risk assessment and management, hazard mitigation.

1. INTRODUCTION

Starting from the legislative, normative and methodological requirements, it can be stated that the occupational risk assessment is the systematic study of all aspects of the work process that are likely to generate unwanted events, of the means of eliminating hazards and applicable prevention and protection measures to control the associated risks [1], [2], [3]. As established in previous studies, businesses that have the ability to devote resources to these issues are more likely to report higher levels of implementation of good OSH practices and to understand that OSH is fundamental to business success their [4], [5]. As long as one of the first individual instinctive needs is that of safety, according to Maslow's pyramid model, and the new trend of addressing the issue of occupational safety and health (OSH) is centered on workers, they are the

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optimal resource for solving these problems [6], [7], [8]. In order to successfully involve each worker in the management system, as a component part of it, all those involved must have a level of knowledge and awareness with similar and unified values, embodied in a safety culture. Understanding, shared and individual acceptance of the safety culture is the starting point of this study. As these prerogatives are fulfilled, they naturally contribute to the efficient operation of a work safety management system. Similarly, management, in general, deals with problems in a unitary way, in common and not individually, in isolation. Only for the identification of the cause-effect connection of the management system is necessary in the first stage the isolation for the individual study of the problem [9], [10], [26], [28], [31], [35].

The proposed approach allows to a certain company to define and implement a risk control tactic starting from the top management level and being integrated into usual, routine activities and operations of the company. In every working places and workstations the manager has the overall mission – imposed by the legal framework - to protect the life, safety integrity, health and wellbeing of every emplyee against accidental risks that may appear in the occupational environmentand, providing work conditions designed to ensure their complete physical, psychological and –nevertheless - social comfort. A certain company, developing his operations in a concrete environment that raise potential hazards will also create –simultaneously – a general context that establishes quite clearly the boundaries within which hazard prevention and must and should be controlled [11], [12]. The implementation by the top – level management, within its responsibilities/and considering his liabilities, of prevention/protection measures/solutions targeting the mitigation of accidental hazards, information/training/awareness raising of workers and confirming the organizational framework and means required imposes to perform an effective occupational hazard/risk evaluation [13]. The above mentioned considerations are quite a sound basis for stating that the main target of occupational risk assessment is always prevention of occupational risks, even if this objective is not really and completely always achievable in day – to – day practice [14]. Always when it is not indeed feasible to eliminate hazards, risks should be diminished in such a way that the residual risks are kept bellow a predetermined level [15]. In later stages and under a rigorous control program, residual risks will be reassessed, considering rationally the opportunity to further /minimize/eliminate/reduce them, following the latest developments in scientific and technical knowledge [16], [27], [29], [30], [37], [40].

Any approach of hazard/risk assessment should cover the work injury risks that are reasonably foreseeable and manageable. All the specific risks resulting from routine activities are normally considered insignificant, requiring no special attention unless professional activity implies their significant, fast increasing aggravation and the occurrence of fast developing worse-case scenarios [17], [18], [19], [20], [32], [39].

The methodology for assessing professional hazards should be defined according to the scope, and nature to ensure they effective and are used in a systematic way [21], [22]. Companies do employ various and differently complex risk assessment tools part of their global strategy to deal with various hazards or activities. The complexity of the risk assessment method does not depend on the size of the organization but on the hazards associated with the organization's activities. Figure 1 shows schematically a simplified, but not simplistic, version of the basic elements of the stage of assessing the risks of injury and illness at work, together with some methodological benchmarks of occupational risk management [23], [33], [36], [38].

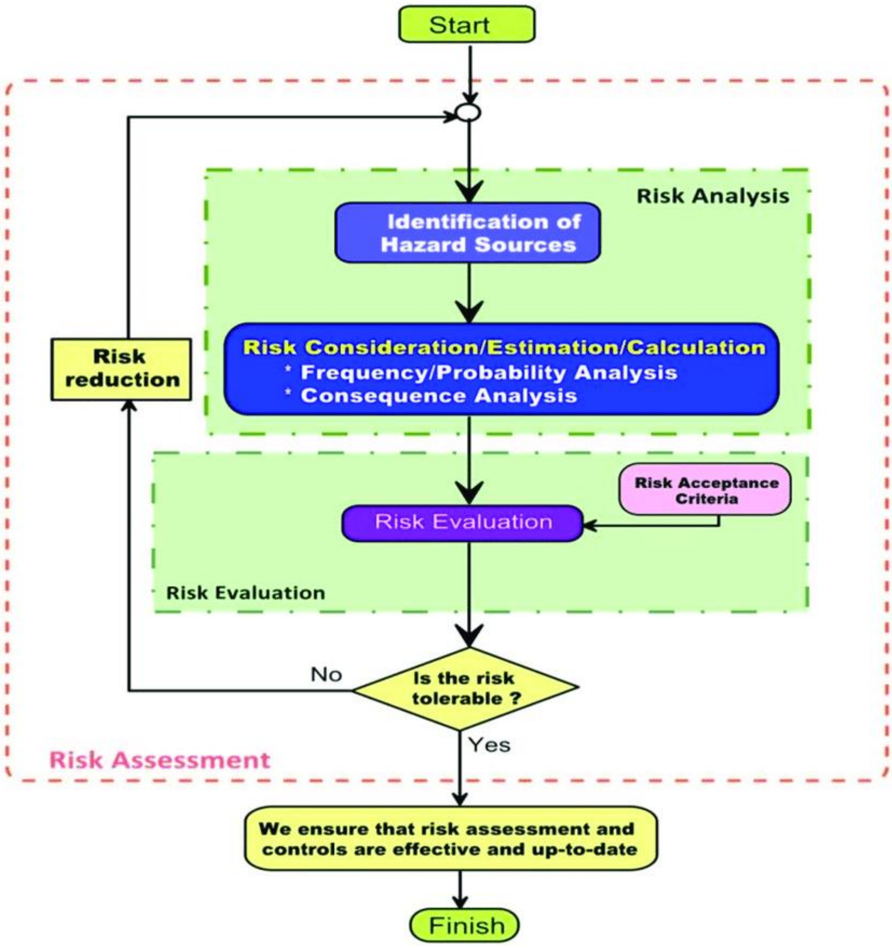

Fig.1. General schematic representation of the risks assessment/management process concerning work injuries and occupational illnesses (adapted after [23])

To be effective, coherent, systematic and sustainable, the risk assessment process should be not unnecessarily complicated, kept sufficiently practical, and easy to understand by all the involved stakeholders. The process must be put in practice only by experts, people with adequate skills, supported by proper technology that is correctly selected and sized for the particular working task. Risk assessment should always and in any circumstances be part of a larger, consolidated framework that resorts to the use of the information gathered to make decisions about risk responses and monitoring, and returns information back into the overall strategic planning process [24], [34], [41].

In accordance with the provisions of art. 15, para. 1, point 1 of H.G. no. 1425/2006 for the approval of the Methodological Norms for the application of the provisions of the Occupational Health and Safety Law no. 319/2006, the first of the prevention and protection activities carried out within the enterprise and/or unit is represented by "*the identification of hazards and the assessment of risks for each component of the respective work system, work load, means of work/work equipment and the work environment at jobs/work stations*". To facilitate the fulfillment of employers' legal obligations in the field of occupational injury and disease risk assessment, a relatively large number of methods have been designed and are currently being used. In the first part of the article, a brief description of the analyzed company and the method developed by I.N.C.D.P.M. Bucharest (purpose, principle, users, stages, method of application, work procedure and application conditions), as well as work tools (risk factor identification list, list of consequences, severity and frequency rating scale, risk level classification grid, etc.). The second part is dedicated to presenting the concrete way of using the method developed by I.N.C.D.P.M. Bucharest for the assessment of occupational injury and illness risks at the company that was the object of the research.

2. MATERIAL AND METHOD

2.1. Overall presentation of the company subject of the research

Electrical Lighting Equipment Manufacturing LLC (general view given in Figure 2), with its 25 years of experience in the field, has become one of the important manufacturers of high-brightness LED lighting systems. In addition to the professional systems it produces and sells all over the world (lighting for potentially explosive environments, lighting for airports and beaconing), the company has developed a range of street, ambient and architectural lighting products. With extensive experience in the design, manufacture and testing of high-intensity LED products, the company offers high-quality products designed and built specifically with LED requirements in mind, not just a replacement for other lighting systems with LEDs. Due to the design and manufacture of these lighting fixtures, customers benefit from technical support at the highest level, system integration or even lighting fixtures designed and manufactured according to the customer's requirements.

Fig.2. General view of the company's headquarters and manufacturing location

The company uses the latest technologies for design, production and testing of products and systems. The high-tech LEDs (the company being certified by OSRAM™) together with very good quality materials (polycarbonate, stainless steel, anodized aluminum, etc.) give the products a special appearance and durability even in difficult operating conditions.

The total number of employees is 46, and the main activity falls under CAEN code 2740 *Manufacture of electrical lighting equipment*. The manufactured products fall under "*Lighting fixtures and systems with high intensity LEDs*". They can be divided into several groups depending on the final destination.

a. High-intensity LED lighting fixtures - here are several fixtures for:

- safety and evacuation lighting;
- exterior lighting (architectural);
- interior lighting;
- street lighting (also in the ATEX version);
- lighting with dynamic color control;
- commercial lighting;
- industrial lighting.

b. Luminaires for airfields

Used in the aviation field for ground lighting, they represent the last group (in order of achievement and concern). Within this group we mention:

- bodies to signal obstacles, of low intensity (type A and B beacons - in several variants);
- obstacle lighting fixtures, of medium intensity;
- runway lighting system for small airports, with several lighting fixtures plus 1.4 A DC power supply system;
- runway access lighting fixture (Figure 3);
- naval lighting fixture.

Fig.3. PAPI – Precision Approach Path Indicator

The resources owned and valued by the company can be summarized as follows:

Buildings:

1. Administrative Building (Ground + Floor + Attic)
   a) Administration offices
   b) Show-room
   c) Electronics laboratory
   d) Photometry laboratory
   e) Changing room 1
   f) Sanitary groups (for each level)
   f) Annexes
2. Production hall (ground floor + partial E) composed of:
   a) Space for production activities
   b) Production offices, warehouse management and quality control
   c) Warehouse
   d) Locker room 2
3. Dyeing hall
4. Production hall (ground floor + first floor)
5. Storehouse

Quality control equipment:

1. Electronics laboratory – 1 pc
2. Photometry laboratory – 1 pc

Machinery, installations, equipments, devices used in the activity:

1. Universal lathe – 2 pcs
2. Hydraulic press – 1 pc
3. Drilling machine – 3 pcs
4. Equipment for cutting metal material - 3 pcs
5. Cutter – 1 pc
6. Welding machine with stored energy - 3 pcs
7. Portable electric welding station – 1 pc
8. Ultrasonic welding machine – 1 pc
9. Compressor – 2 pcs
10. Ecological soldering station (lead-free flux) – 10 pcs
11. Conductor slipper machine – 1 pc
12. Conductor cutting machine – 1 pc
13. Oven - 2 pcs
14. Power source, grates – 6 pcs
15. Metal cutting machine with numerical control (CNC), Figure 4 – 2 pcs
16. Engraving and cutting equipment (Laser), figures 5 – 1 pc
17. Equipment for cutting metal landmarks (Guillotine) – 1 pc
18. Band-cutting machine – 2 pcs
19. Polishing machine with disc - 1 pc
20. Water jet cutting equipment – 1 pc
21. SMD planting line – 1 pc
22. MIG MAG welding equipment – 1 pc

23. Painting installation in the field - 2 pcs
24. CNC machining center – 1 pc
25. Foil application line – 1 pc
26. Electric forklift – 1 pc
27. Gas thermal power plants

Fig.4. Metal cutting machine with numerical control (CNC)

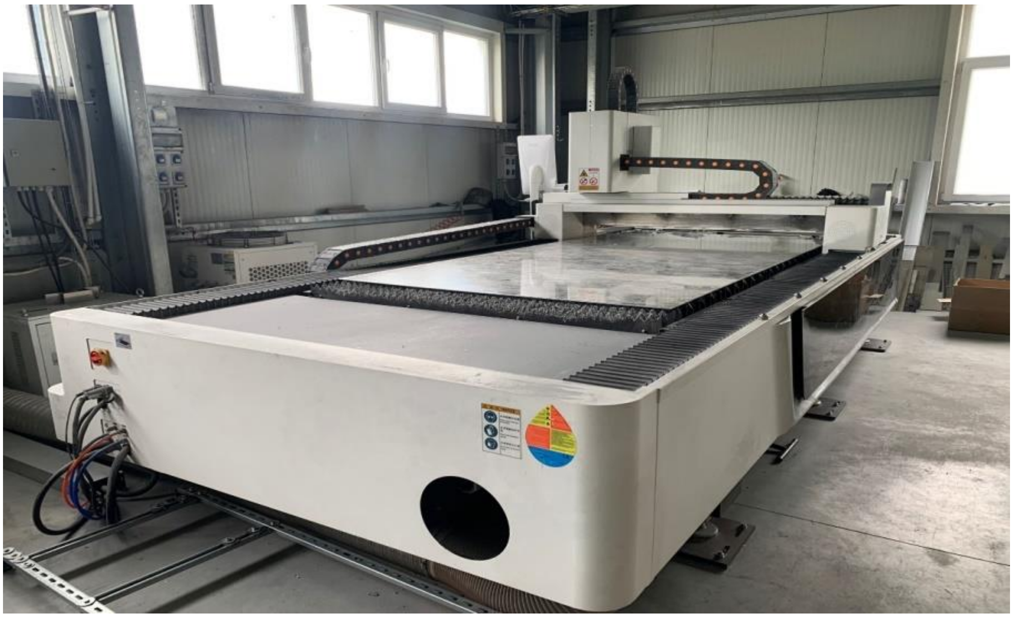
Fig. 5. Engraving and cutting equipment (Laser)

The distribution of workers by workstations/jobs is summarized in table 1.

Table 1. ***List of workplaces for which the risk assessment was carried out***

Crt. No.	**Job/workstation**	**Number of workers**
1.	Numerically Controlled (CNC) Metal Cutting Machine Operator	2
2.	Engraving and cutting equipment operator (Laser)	2
3.	Assembler of electronic subassemblies	6
	Other categories of staff members	36
	TOTAL	46

2.2. Brief description of the I.N.C.D.P.M. Bucharest tool for assessing the risks of occupational accidents and illnesses

The method includes the following mandatory **steps**: *i) defining the system to be analyzed (workplace); ii) identification of risk factors in the system; iii) assessment of occupational injury and illness risks; iv) the ranking of risks and the establishment of prevention priorities; v) proposing preventive measures*.

The **work tools used**: the stages necessary for the assessment of work safety in a system, described previously, are carried out using the following work tools:

a. *List of identification of risk factors;*
b. *List of possible consequences of the action of risk factors on the human body;*
c. *Rating scale of severity and probability of consequences;*
d. *The risk assessment grid;*
e. *The classification scale of the risk levels, respectively of the security levels;*
f. *Job sheet - centralized document;*
g. *List of proposed measures.*

The stages of application of the method:

a. *Setting up the analysis and evaluation team;*
b. Description of the system to be analyzed;
c. Identification of risk factors in the system;
d. Risk assessment and ranking;

The formula for calculating the global risk level is as follows :

$$N_r = \frac{\sum_{i=1}^{n} r_i \cdot R_i}{\sum_{i=1}^{n} r_i} \qquad (1)$$

where:

N_r is the global risk level at the workplace;
r_i – rank of risk factor "I";
R_i – risk level for risk factor "I";
n – the number of risk factors identified at the workplace.

In the case of the evaluation of some macrosystems (sector, section, enterprise), the weighted average of the average safety levels determined for each job analyzed from the composition of the macrosystem is calculated (similar jobs are considered as a single job), in order to obtain the global level of work safety for the workshop/section/sector or the investigated enterprise – N_S:

$$N_g = \frac{\sum_{p=1}^{n} r_p \cdot N_{sp}}{\sum_{p=1}^{n} r_p} \qquad (2)$$

where:

r_p is the rank of the job "p" (equal in value to the risk level of the job);

n - the number of analyzed jobs;

N_{sp} - average level of job security for job "p".

e. *Establishing preventive measures*

The application of the method ends with the drafting of the analysis report. This is an informal instrument that must contain, clearly and succinctly, the following:

- the manner of carrying out the analysis;
- the persons involved;
- the results of the assessment, respectively job sheets with risk levels;
- interpretation of the evaluation results;
- prevention measures sheets.

3. ASSESSMENT OF ACCIDENTAL RISKS FOR THE WORKPLACE: OPERATOR METAL CUTTING MACHINE WITH NUMERICAL CONTROL (CNC) FROM ELECTRICAL LIGHTING EQUIPMENT MANUFACTURING LLC

The working process: making unique pieces and small series for different industrial fields, made of metal according to drawings, models or prototypes.

The components of the evaluated work system

a.Working equipments: machine with numerical control (CNC); chucks, drills, reamers, cutters, chamfers, taps for different types of threads; fixed keys, adjustable keys; hydraulic printing press; clamping vise and clamps for material; measuring equipment: subler, micrometers, gauges; 3D coordinate measuring machine and 2D coordinate measuring machine; storage shelves for raw material and finished parts; platform cart for transporting goods; emulsion (lubricating and cooling fluid); compressor and compressed air storage cylinder at 8 bar.

b.Working task: preparation of the semi-finished product for the machining operation by chipping; running the CNC program on the numerical control machine according to the operating instructions and technical specifications; measuring and checking the parts using the measuring instruments, according to the requirements and technical specifications; loading and handling components using lifting and/or transport equipment in safe conditions; ensures that all products executed in the process meet the quality conditions and technical specifications; participate in daily start-of-shift meetings; periodically checks the condition of the tools, devices and verifiers used, prepares them for the processing of the next benchmark and performs their cleaning before storing them in the specially designed space; ensures the change of tools and inserts; keeps both the CNC machine he operates and the tools, devices and equipment he uses in good working order; performs and maintains the cleanliness of the CNC machine, including the periodic removal of chips to ensure its proper operation; ensures the maintenance of the CNC machine according to the work instructions;

c. Working environment: natural and artificial lighting; natural and artificial ventilation; adjustable temperature in the cold season. The premises are heated with radiant panels; air currents on the work route; electromagnetic radiation near electrical equipment; natural calamities; pneumoconiogenic dusts - metal and graphite dusts (from milling, polishing and polishing activities); toxic vapors, toxic gases.

Applying the tools and the procedure specific to the INCDPM Bucharest method [25], the specific risks factors present in the working system were identified, the severity and the probability classes related to each of the identified risks were assigned, and then the partial risk levels were set. The results obtained are centralized in Table 2. The meaning of the notations in table 3 is as follows: *WSE - Work system element; IR - identified risk; RF – risk factor; MC - Maximum consequence; S - Severity; Likelihood; RL - Risk level; WE - Working equipment; OE - Occupational environment; WT - Working task; HF - Human factor; N-negligible; LTI 3-45 – Lost Time Injury from 3 to 35 days; LTI 45-180 – Lost Time Injury from 45 to 180 days; INV I – first degree invalidity; INV II – second degree invalidity; INV III – third degree invalidity; D – death.*

Table 2. ***The evaluation form of the analyzed workplace***

ELEM LLC		**EVALUATION FORM**	**Exposed workers: 2** **Exposure length: 8 hours**			
Work station: Operator metal cutting machine with numerical control			**Assessors:** Risk assessor Tehchnical staff/engineer Occupational physician Worker/operator			
WSE	**IR**	**Risk Factors**	**MC**	**S**	**L**	**RL**
WE	Mech. RF	**1. Moving machine parts - crushing - the human body is caught between two moving pieces of equipment (F1)**	**Death**	**7**	**3**	**5**
		2. 2. Machine parts in motion - shearing - when a part of the human body (especially fingers) is caught between two machine components, one fixed and one moving, the result leads to amputation (F2)	INV III	4	2	3

		3. Moving machine parts - getting clothes or hair caught in the rotating parts of the machine, this can lead to the person being pulled into the machine (F3)	**Death**	**7**	**2**	**4**
		4. Machine parts in motion - projecting metal chips and tools during CNC operation, these materials can enter the human body. (F4).	INV III	4	1	2
		5. Unbalance/rolling/falling of heavy metal parts (F5)	LTI 3-45	2	2	2
		6. Free fall of incorrectly positioned parts, tools, materials or during manual handling (F6)	LTI 3-45	2	3	2
		7. Direct contact with dangerous surfaces (cutting, stinging) (F7)	LTI 3-45	2	6	3
	Thermal RF	8. Contact with hot surfaces of metal parts or cutters immediately after processing, if cooling was not adequate during processing (F8)	LTI 3-45	2	2	2
	Electrical RF	9. Electrocution by direct contact with uninsulated cables (F9)	**Death**	7	1	3
	Chemical RF	10. Working with flammable substances - transmission oil (F10)	**Death**	7	1	3
		11. Working with emulsion - which can cause an allergic skin reaction (F11)	LTI 3-45	2	6	3
OE	Physical RF	12. Noise from work equipment. (F12)	LTI 3-45	2	6	3
		13. Natural calamities - earthquakes, storms, lightning (F13)	**Death**	7	1	3
		14. Low lighting level, especially when working in dark areas and during the evening (F14)	LTI 3-45	2	3	2
		15. Slipping on wet or frozen surfaces, when moving outside the hall (F15)	LTI 3-45	2	3	2
	Chemical RF	**16. Pneumoconiogenic dusts in the atmosphere of the workplace (metallic dusts or hazardous fog formed from fine powder from the processed material or metal powder from tools and emulsion vapors during the operation of the equipment CNC) (F16)**	**Death**	**7**	**3**	**5**
WT	Unadequate content	17. Wrong sequence of CNC power on/off operations (F17)	**Death**	7	1	3
		18. Wrong operations, rules, procedures - the absence of operations indispensable to work safety (F18)	**Death**	**7**	**2**	**4**
		19. Storing materials on shelves improperly, exceeding the safety factor given by the shelf manufacturer (F19)	LTI 3-45	2	3	2

	Mental overload	20. Monotony of work - repetitive operations (F20)	LTI 3-45	2	3	2
HF	Wrong actions	21. Improper fixation of workpieces (F21)	LTI 3-45	2	3	2
		22. Hand grip - improper finger positioning between the chuck and CNC main shaft or improper finger positioning between the workpiece and the hydraulic press (F22)	**INV gr.III**	**4**	**4**	**4**
		23. Working without protective devices (LEXAN windows) (F23)	LTI 3-45	3	2	2
		24. Carrying out maintenance operations on CNC machines without disconnecting the machine from the power source (F24)	**Death**	**7**	**3**	**5**
		25. Falling to the same level by slipping, tripping, unbalancing (F25)	LTI 3-45	3	3	3
	Omissions	26. Wearing inadequate personal protective equipment or not wearing protective equipment (F26)	**Death**	7	1	3

The overall risk level of the job is:

$$N_{rg} = \frac{\sum_{i=1}^{26} r_i \cdot R_i}{\sum_{i=1}^{26} r_i} = \frac{3 \cdot (5 \times 5) + 3 \cdot (4 \times 4) + 10 \cdot (3 \times 3) + 10 \cdot (2 \times 2)}{3 \times 5 + 3 \times 4 + 10 \times 3 + 10 \times 2} = \frac{223}{77} = 2{,}89 \qquad (3)$$

The ranking of the identified risks is summarized in the histogram shown in fig. 6, and the proposed measures for the prevention of risks and the protection of exposed workers, in table 3.

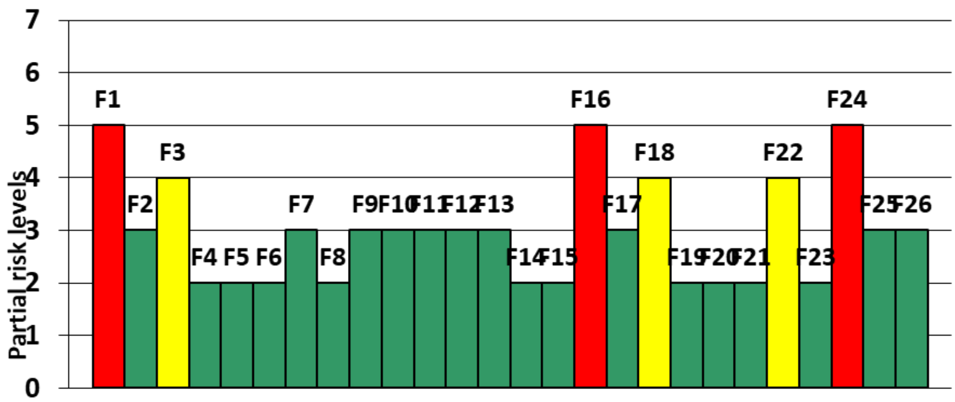

Fig.6. Partial risk levels by risk factors: „Operator metal cutting machine with numerical control (CNC)"

Table. 3. ***The list of proposed measures: „Operator metal cutting machine with numerical control (CNC)"***

Crt. no.	Risk factor identified, assessed and ranked	Risk level	Prevention/protection measures
1.	**F1:** Moving machine parts - crushing - the human body is caught between two moving pieces of equipment	5	***Organizational measures:*** • daily visual inspection of the car enclosure to check that all panels are in place. • visually inspect the enclosure and safety glass for any signs of warping, cracking or other damage. • prohibiting the start or continuation of work if the absence, damage or incorrect placement of protective devices is found. • training workers and checking how safety rules are respected. • testing the door safety lock:
2.	**F16:** Pneumoconiogenic dusts in the atmosphere of the workplace (metal dusts or hazardous fog formed from fine powder from the processed material or metal powder from tools and emulsion vapors during the operation of CNC equipment)	5	***Technical measures:*** • purchase of a fog evacuation system ***Organizational measures:*** • training on the need to use protective glasses or a breathing mask • periodic ventilation of the production hall every 2 hours.
3.	**F24:** Carrying out maintenance operations on CNC machines without disconnecting the machine from the power source	5	***Organizational measures:*** • • training workers regarding the Lock out procedure - tag out;
4.	**F3:** Moving machine parts - getting clothes or hair caught in the rotating parts of the machine can lead to the person being pulled into the machine.	4	***Organizational measures:*** • training workers on the importance of not coming close with any part of the body to moving machine components or when movements may occur. • ensure casual clothing and make sure all staff have their hair tied up.
5.	**F18:** Wrong operations, rules, procedures - the absence of operations indispensable to work safety	4	***Organizational measures:*** • training workers regarding the consequences of non-compliance with safety restrictions - non-use or incomplete use of protective

			equipment, etc. • verification by permanent control, from the head of the formation, and/or by survey, from the hierarchically superior bosses.
6.	**F22:** Hand grip - improper finger positioning between the chuck and CNC main shaft or improper finger positioning between the workpiece and the hydraulic press	4	***Organizational measures:*** • training workers on hand positioning; • installation of warning icons

Interpretation of assessment results

The global risk level calculated for the job "*Operator metal cutting machine with numerical control (CNC)*" is equal to 2.89, a value that places it in the category of jobs with a low to medium level of risk, not exceeding the maximum acceptable limit (3.5).

The result is supported by the "Assessment Sheet", from which it can be seen that out of the total of 26 risk factors identified, only 6 exceed, as a partial level of risk, the value of 3.5 falling into the category of high risk factors, and 3 falling into -are in the category of medium risk factors. To reduce or eliminate the 6 risk factors (which are in the unacceptable range), the generic measures presented in the "*Proposed measures sheet*" are necessary.

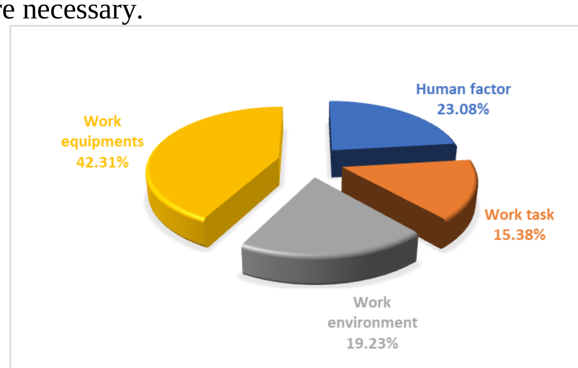

Fig.7. The share of risk factors identified by the elements of the work system „Operator metal cutting machine with numerical control (CNC)"

Regarding the distribution of risk factors by generating sources, the situation is as follows (fig.7):

- 41.31%, factors specific to the means of production/work equipment;
- 15.38%, factors specific to the work environment;
- 19.23%, factors specific to the workload;
- 23.08%, human factor related risks.

From the analysis of the *Evaluation Form*, it is found that 13 (50%) of the identified risk factors can have irreversible consequences on the performer (death or disability).

4. CONCLUSIONS

This study aimed at assessing the risks and developing the prevention and protection plan for Electrical Lighting Equipment Manufacturing LLC, in accordance with the provisions of art. 7, para. 4, lit. b, art. 12, para. 1, lit. and art. 13 of Law no. 319/2006 and art. 15, para. 1, points 1 and 2 of H.G. no. 1425/2006. The results of the risk assessment are presented in the "Job Evaluation Sheet" and the "Proposed Measures Sheet" related to each analyzed workplace. The list of jobs evaluated and the primary results obtained is presented in table 4.

Table 4. ***Risk assessment overall results***

Nr. crt	**File no.**	**Workplace/job**	**Overall risk level for each job**
1	F01	Operator metal cutting machine with numerical control (CNC)	2.89
2	F02	Assembler of electronic subassemblies	3.20
3	F03	Engraving and cutting equipment operator (Laser)	2.94

The overall risk level for the three jobs is:

$$N_{gs} = \frac{\sum_{i=1}^{3} r_i \cdot N_{gi}}{\sum_{i=1}^{3} r_i} = 2{,}98 \tag{4}$$

The ranking of places, depending on the global level of risk, is shown in table 5.

Table 5. ***Hierarchy of risks on the workstations where the evaluation was carried out***

Nr. crt	**File no.**	**Workplace/job**	**Ranked overall risk level for each job**
1	F02	Assembler of electronic subassemblies	3.20
2	F03	Engraving and cutting equipment operator (Laser)	2.94
3	F01	Operator "metal cutting machine with numerical control (CNC)”	2.89

According to the ranking, it is found that all workplaces have a global risk level below the allowed limit (3.5) they fall into the category of those with a low to medium risk level. The value of the aggregate global risk level per company NgS = 2.98, determines its inclusion in the category of those with a low to medium risk level. As a rule, the action of a risk factor is eliminated / diminished by several measures, one of which is mandatory of an organizational nature (OSH training). In the same way, a measure can act on several risk factors. Depending on the result, the measures can be:

- organizational measures for the worker and the work load;
- technical measures for the means of production and the work environment.

The development of the prevention and protection plan requires ensuring a significant consultation on the part of the employees. The specialized literature in the field of OSH emphasizes the need to use as a management tool the active involvement of all employees in the adoption of decisions that directly concern them. Prevention and protection measures primarily impact workers. Therefore, a realistic plan of measures is based on the widest possible consultation of the employees of the respective organization. The selection of measures will be made not only depending on the level of risks they will eliminate or reduce, but also on the cost-benefit ratio.

The proposed measures (technical, organizational, hygienic-sanitary, others) together with the deadline and the responsible person make up the mitigation-elimination systems. These measures will be taken for each identified factor. Even if all the proposed preventive measures are taken, there are risk factors that cannot be eliminated, called residual risk factors in the specialized literature. These risk factors can be kept under control through organizational measures. Statistics show that most accidents are related to non-observance of OSH instructions. As a result, there will be an emphasis on the professional training of workers for the formation of the security culture at the workplace and the awareness of professional risks, if they do not respect the work procedures.

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