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ERGONOMIC STUDY AND ANALYSIS OF WORKSTATION IN A MANUFACTURING ENTERPRISE

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Purpose: The purpose of this article is to present the essence of ergonomics in the position of an assembler in a manufacturing company. Ergonomics is often marginalized in enterprises and its great impact on employee productivity and task satisfaction is overlooked. The purpose of the study was to analyze working conditions and propose ergonomic solutions. Physical strain, mental strain, environmental working conditions and the monotony found at the workplace were analyzed in detail.
Design/methodology/approach: All ten employees of the assembly department were surveyed. It should be emphasized that before any changes were implemented, the assemblers' material work environment, working conditions and task loads during the work shift were examined. The following research methods were used: Participatory observation, OWAS method, Chronometry, Lehmann chronometric-tabulation method.
Findings: According to production records, before the introduction of ergonomic recommendations, an average of 748 pieces were made at the surveyed workstations during one shift. One month after the introduction of ergonomic solutions, the daily norms were re-examined and on average the number of products made, during one work shift, increased by 3%, or about 22 pieces. Ergonomics also positively affects the company's bottom line.
Research limitations/implications: The implementation of ergonomic research is very time-consuming. Observation of employees, making chronometry, analysis of the material environment. All this makes the execution of such a research project take a very long time.
Practical implications: All the economic benefits that any company can see through the implementation of ergonomic solutions, undoubtedly the strengths of these measures are the improvement of employee safety, the reduction of workplace accidents, the minimization of health ailments associated with improper working conditions, increased job satisfaction, less work fatigue, and the reduction of the uniformity of the work process.
Social implications: It is extremely necessary in order to make appropriate modifications to workstations based on the data obtained. After all, this will ensure that employees work safely, efficiently and with the least possible biological cost.
Originality/value: A new element for sure is to look at the essence of ergonomics in manufacturing companies.
Keywords: ergonomics, enterprise management, human resources management.
Category of the paper: research paper, case studies.

1. Introduction

Ergonomics is an interdisciplinary science, the main objective of which is to adapt the material working environment, working conditions and all tools and equipment used in work processes to the psychophysical and anatomical capabilities of the employee, so that he can work efficiently, productively, safely and at the least possible biological cost (Sluchak, 1992, p. 107). This is a definition well known to the theorists of economic science, but practitioners who function in the business environment do not quite see the need to implement ergonomic solutions in their workplaces. This is due to the fact that occupational health and safety and workplace ergonomics are treated separately. All issues related to occupational health and safety are regulated and codified in detail in Chapter X of the Labor Code, as well as in regulations issued by the Ministry of Labor and Social Policy. Employers strictly follow the rules for creating a safe work environment, but do not always pay attention to ergonomics.

As part of the research project carried out for the creation of this paper, an analysis was made of the working conditions of a team of employees involved in the assembly of small electronic components in one of the manufacturing companies operating in the Kujawsko-Pomorskie region.

The purpose of this article is to present the essence of ergonomics in the position of an assembler in a manufacturing company. Ergonomics is often marginalized in enterprises and its great impact on employee productivity and task satisfaction is overlooked. The purpose of the study was to analyze working conditions and propose ergonomic solutions. Physical strain, mental strain, environmental working conditions and the monotony found at the workplace were analyzed in detail. OWAS methods and Lehman's table were used for this purpose. All ten employees of the assembly department were surveyed. It should be emphasized that before any changes were implemented, the assemblers' material work environment, working conditions and task loads during the work shift were examined. In addition, in order to indicate the economic benefits of ergonomic solutions, the productivity of all assemblers during the 5 working days was also examined. Then, based on the data obtained, a list of ergonomic recommendations was developed, which for research purposes were allowed to be implemented at the assemblers' workstations. After all the changes were implemented, the productivity of the workers was examined.

This article is structured as follows. First, the essence of ergonomics as an interdisciplinary science is described, followed by a characterization of the factors affecting the increase of job satisfaction and improvement of productivity. The empirical part analyzes the workloads of employees at workstations in the studied enterprise.

2. The essence of ergonomics as an interdisciplinary science

The first time ergonomics as a scientific discipline was written about was by Wojciech Bogumił Jastrzębowski, the initiator of ergonomic activity worldwide, in his article "An outline of ergonomics, or the science of work, based on truths derived from the Science of Nature" (Koradecka, 2012). Unfortunately, his observations on the lack of adaptation of the work environment to the needs of the worker did not meet with the interest of the owners of thriving industrial plants and factories at the time. It was not until 1949 in the UK that the term ergonomics was somewhat brought back into existence. At that time, the first Ergonomics Research Society was created. On the other hand, the intensification of research and the emergence of ergonomics as a practical field occurred in the 1940s, so although the term ergonomics itself was coined as early as 1857, it is a relatively young discipline of science (Dul, Weerdmeester, 2001).

Parallel to the development of ergonomics as a scientific discipline, its definition has also evolved. Initially ergonomics was qualified as a science of occupational work, while today ergonomics has also permeated various human activities, not only occupational. Originally, ergonomics focused solely on adapting equipment to humans, in the post-war period it was also joined by adapting the environment and the organization of work, and now ergonomics applies to all technology both at work and at home, at school, in transportation and many other areas of life (Muszyński, 2016).

Defining the concept of ergonomics has undergone many changes over the years, mainly the modifications concerned the perception of man and his role. Currently, all definitions focus precisely on man, it is his needs that are to be at the center of ergonomic activities. Thus, according to the Polish Ergonomic Society, it is a science that strives to best adapt tools, machines and the work environment to human requirements, both physical and psychological. The International Ergonomic Society, on the other hand, considers ergonomics to be a science that explains all the connections and relationships that exist between man and the other components of the system, and between the occupation in which various methods are used for designing in such a way as to optimize the entire system for the benefit of man. And according to Fernandez, ergonomics is nothing more than the design of the workplace, equipment, machinery, tools in such a way as to adapt them to the psychological capabilities of man, and thus optimize his efficiency and productivity at work while ensuring the safety, health and well-being of workers. In turn, one of the most recent definitions of ergonomics is presented by Capodaglio, who believes that it is the taking of all measures to better adapt tasks, activities, objects and tools to manual handling, as well as the design of the work environment to the needs of the worker (Capodaglio, 2022).

The definitions presented clearly emphasize that the main area of interest in ergonomics is the human being. However, one cannot fail to mention that any measures implemented in an organization while optimizing human labor will have overtones of economic efficiency. Undoubtedly, increasing productivity or improving the quality of manufactured products will be some kind of secondary consequence resulting from the implementation of initiatives to improve the safety and comfort of employees.

Analyzing the definitions presented above, it should undoubtedly be recognized that ergonomics is interdisciplinary in nature. In terms of a multidisciplinary perspective, the following groups can be distinguished: human disciplines and work-related disciplines. The first group includes anthropometry, medicine, physiology, psychology, or pedagogy. On the other hand, the second group includes mechanical engineering, technology, economics and organization, as well as aesthetics and law. All of the above-mentioned disciplines should be treated equally. In addition, the main purpose of ergonomics should be seen through the prism of the above two groups. On the one hand, it is necessary to humanistically and utilitarian optimize the work environment by adapting it to human needs and characteristics. And on the other hand, it is necessary to use human knowledge to design appropriate workplaces.

3. Factors influencing increased job satisfaction and improved productivity

Ergonomics is a scientific discipline very often identified exclusively with occupational safety. It should be noted that this is a very narrow area of ergonomics' influence. Unfortunately, the research of Polish scientists also rarely deals with analyzing ergonomic activities in enterprises from the perspective of the economic benefits achieved. As already mentioned, ergonomics is an interdisciplinary science, which means that its scope covers many scientific issues, but with the assumption that they all concern humans. Given the subject matter of this study, as well as the research project carried out, two important areas that are affected by ergonomic solutions will be pointed out. The first issue will be the economic benefits that any organization can undoubtedly gain by implementing ergonomic recommendations.

High labor productivity is one of the primary goals of any enterprise, especially manufacturing enterprises, it helps to achieve the desired economic goal and gain a competitive advantage in the market. At the same time, the competitive advantage built largely through human resources influences the interest of enterprises in the needs of employees and the factors affecting their labor productivity (Goel, Agrawal, 2017).

Undoubtedly, a great influence on the increase in productivity is the implementation in the enterprise of solutions that support technological progress, improving previously used production techniques, or new ways of organizing work. However, the impact of technical and production factors on productivity growth should not be analyzed in isolation from the effectiveness of the human being, who is the productive force behind most processes. The analysis of productivity should take into account all ergonomic considerations, i.e. the psychophysical capabilities, anatomical needs of man and elements of the environment affecting the quality of his work.

All that a person can do as well as is able to do is the ability to work. A distinction in this regard can be made between acquired knowledge, qualifications, but also various types of aptitude, such as the ability to memorize quickly, intelligence quotient, precision. In addition, the ability to do the job well is also determined by the predispositions possessed by the employee, all kinds of learned professional skills and both physical and mental capabilities. All this results in a certain work efficiency.

Willingness to work, on the other hand, will largely depend on the ergonomics of the job. It is the appropriate material and social conditions in the workplace that will intensify the desire to perform tasks. It is also the appropriately designed pace and nature of work, adapted to the capabilities of employees, that will make their productivity increase (Masharyono, Pratama, 2016).

Willingness to work is an issue subject to numerous variables, since human behavior is a component of many, sometimes even minor, seemingly insignificant situations and factors. Largely dependent on technical issues, but also on the relationships within the company and between employees, more generally speaking, any stimulus that affects a person. Each such element contributes to an employee's behavior and approach to the task at hand. In the case of companies, the important factors are those that stimulate employees to specific actions or behaviors. However, it should be borne in mind that the effectiveness of the incentives used is not universal and should be adapted to the individual needs of the group. Undoubtedly, just as important for each employee as for each entrepreneur will be the benefits obtained during the performance of work. The literature most often describes social benefits and economic benefits (Middlesworth, 2021).

The most important benefit, of course, should be the health and well-being of employees. However, there are common benefits to be found in the fact that risk factors at the workplace are systematically reduced. By using ergonomic solutions, the onset of serious musculoskeletal disorders can be prevented. Since the costs of workers' compensation resulting from the development of occupational diseases in the workplace are large, designing ergonomic workstations is a way to achieve significant savings. And, more importantly, it helps reduce the occurrence of occupational diseases.

Another undoubted benefit is improved productivity through ergonomics of the workstation. If the workstation is designed in such a way that the employee, while performing basic daily activities, can adopt the right posture, this undoubtedly reduces his physical effort, makes him move less, and improves his reaches. All of this leads to such a position becoming more efficient (Bamfo-Agyei, Atepor, 2018).

The next positive aspect of ergonomics, which is an economic benefit, is its significant impact on the quality of work and thus on the quality of manufactured products. Lack of ergonomics at the workplace leads to frustration and fatigue of workers who do not do their jobs properly. Lack of appropriate machinery, equipment or work tools, failure to prepare the workplace for the tasks to be performed by the employee on it are elements that will affect the final result of the work. Lack of training, improper selection of an employee for the tasks he or she is assigned to perform, all this will cause the quality of work to decline. There may be more defects in finished products, and this in turn will increase the percentage of complaints, and consequently affect the company's bottom line. Hence, it is so important that the workstation is adapted to the needs, capabilities of the employee at any age and allows him to perform his professional duties efficiently (Goździewska-Nowicka, 2019).

In delving into the social benefits of creating ergonomic workplaces, it is important to note that employees are more engaged in their work. The scheme of action is extremely simple. Namely, when the authorities of an enterprise do everything to provide employees with a safe and ergonomic work environment, then they can expect that work will not be burdensome for subordinates, there will be no signs of fatigue or discomfort. As a result, this can help reduce turnover, reduce absenteeism, improve morale within the team, and increase commitment to their work. Increasingly, surveyed employees emphasize that it is not only the financial aspect that is important to them, but precisely a work environment that is optimally tailored to their needs (Study report, 2022).

The summary for the above considerations is to point out that the application of ergonomic recommendations in the workplace contributes to strengthening the safety culture of the company. Safe and healthy employees are an organization's most valuable resource. Undoubtedly, creating and fostering a health and safety culture in the company will lead to better performance of people in the organization.

4. Analysis of the workloads of employees at workplaces in the studied enterprise

The research project conducted at the company consisted of an ergonomic analysis of working conditions. In order to propose ergonomic solutions at the company, it was necessary to conduct a detailed analysis of the assemblers' positions. For this purpose, all ten assemblers working in the assembly department were surveyed. The measurements carried out made it possible to assess the physical and mental workload of the employees and to evaluate the conditions of the material working environment. The research was conducted for 5 working days. Ten employees of the assembly department were observed. All workers were men in the age range of 25-30 years. Their work experience does not exceed 5 years of work. All of them have vocational education.

Assessing the physical load consisted of examining three elements of the work performed. First, the energy expenditure incurred to perform the activity was examined. Next, the degree of load of a static nature was examined, as well as the level of monotypicality of movements performed during work. The analysis involved several steps, it began with the observation of the course of work on the production line, then a chronometer was drawn up for one work shift, that is, all the activities performed by the worker were listed and the duration of each activity was measured separately. The energy cost incurred by the worker was estimated using Lehmann's chronometric-tabulation method, in which the previously prepared chronometer is used, the energy expenditure of all the activities performed during the shift is summed up, and the result is interpreted according to a five-level scale of work severity (Lehmann, 1933). On the other hand, the assessment of static effort, which is part of the physical load, was performed using the OWAS method. It allows the identification of hazards and estimation of risks, resulting from the positions adopted during work and external load (Kee, Na, Chung, 2020). The last of the elements that make up physical effort is monotypicity. Wanting to determine the monotonicity of movements in the work of an assembler also had to use the chronometric method, and then the data obtained was verified according to the table for assessing the load of monotypicity of precision movements (Bugajska, 2002).

The survey was conducted at a manufacturing company that specializes in producing electronic products, connector systems, networks and sensors. There are 10 employees working in the assembly plant department in five workstations. The analysis presented below has been divided by position, as employees performing the same tasks worked in very similar time frames and were averaged for the purposes of this study. At workstation 1 and workstation 2, two workers each perform the same tasks, namely scooping male pins into ribbons (workstation 1) or female pins (workstation 2). Each time, the operator reaches the tape out of the container with his right hand, places it on the machine's countertop in the correct way to be scored, then removes the scored tape, checks the correctness of the pins made and puts it back in the container with the finished tapes. On the other hand, at workstation 3, two workers assemble the impaled tapes in the cube. The task is to connect three pieces of tape to one cube. Workers manually nail the female contacts, using a so-called comb, and this requires them to use a lot of force and make many wrist movements. Once the task is completed, the finished piece is deposited in a container. At workstation 4, workers perform the same task as workers at workstation 3, but they don't have to use a comb because they scoop male pins into the ankle, and this doesn't require a forceful solution. On the other hand, at workstation 5, workers visually check the correct placement of the pins in the cubes, then place each product in the tester by performing an electrical test, after which they mark the goods with an adhesive label and deposit them in the finished goods container. All workers are given one 15-minute break. They perform their work in a sitting position without the possibility of changing to another position.

The activities performed by the workers are not characterized by a high degree of complexity, so they have the opportunity to communicate freely while performing their work.

All assembler workstations require the worker to assume a sitting position with forearms below the shoulder line. Since this is precision work it often generates stooping in operators, but does not require the use of force. It is by far the dominant position during the work shift, lasting about 89% of the time, or more than 7 hours a day. A negligible amount of time, less than an hour a day, is spent by workers in the standing position, mainly at the end of the shift when securing cartons of previously packed details. Table 1 presents the results of an assessment of the musculoskeletal load resulting from postural discomfort to which workers in the assembly department are subjected.

Table 1.
Assessment of musculoskeletal load on assembly plant workers using the OWAS method

Workstation	Position	Code back	Code arms	Code legs	Code load	Category	Time spent in position [%]
Workstation 1	sitting	2	1	1	1	2	88,4%
	standing	1	1	2	1	1	11,6%
Workstation 2	sitting	2	1	1	1	2	93,3%
	standing	1	1	2	1	1	6,7%
Workstation 3	sitting	2	1	1	1	2	93,7%
	standing	1	1	2	1	1	6,3%
Workstation 4	sitting	2	1	1	1	2	94,8%
	standing	1	2	2	1	1	5,2%
Workstation 5	sitting	2	1	1	1	2	95,8%
	standing	1	2	2	1	1	4,2%

Source: own study.

The data presented in Table 1 shows that the sitting position assumed by all assembly plant workers for more than 88.4% of their working time, and this represents a high risk of musculoskeletal ailments.

Table 2 shows what energy expenditure is incurred by assembly plant workers performing work during one work shift.

Table 2.
Measuring the energy expenditure of assembly plant workers according to Lehmann

Workstation	Position	Time [min]	Energy expenditure [kcal/min]	Type of work performed	Energy expenditure [kcal/min]	Total Energy expenditure
Workstation 1	sitting	424	0,3	Work of fingers, hands and forearms	0,4	308 kcal
	standing	56	0,6	Working both arms	1,5	84 kcal
Workstation 2	sitting	448	0,3	Work of fingers, hands and forearms	0,4	313,6 kcal
	standing	32	0,6	Working both arms	1,5	67,2 kcal
Workstation 3	sitting	450	0,3	Work of fingers, hands and forearms	0,4	315 kcal
	standing	30	0,6	Working both arms	1,5	63 kcal

Cont. table 2.

Workstation 4	sitting	455	0,3	Work of fingers, hands and forearms	0,4	318,5 kcal
	standing	35	0,6	Working both arms	1,5	73,5 kcal
Workstation 5	sitting	460	0,3	Work of fingers, hands and forearms	0,4	322 kcal
	standing	20	0,6	Working both arms	1,5	42 kcal

Source: own study.

The data presented in Table 2 show that workers do not incur a large energy expenditure from physical workload during their work shift. This is due to the fact that they assume a sitting position for many hours and perform precision activities. However, the latter is linked to the next work element examined, namely the monotypicity of precision movements (Table 3).

Table 3.
Measuring monotypicity of movements of assembly plant workers

Workstation	Number of actions in 1 operation	Duration of operation [s]	Number of operation during 1 h	Number of operation's repetitions per work shift
Workstation 1	6	111	32	256
Workstation 2	6	112	32	256
Workstation 3	5	123	29	234
Workstation 4	5	119	30	242
Workstation 5	4	78	46	369

Source: own study.

The data in the table shows that assembly plant workers perform the least 234 repetitions of operations during a work shift, each operation is built up of several operations, so during the day the employee working in the position with the least number of operations performed performs as many as 1170 operations.

Another category studied was the analysis of mental workload. Mental workload assessment is an examination of both mental effort and work monotony. Mental effort analysis involves observing three areas of work: receiving information, making decisions and performing activities. Each of these is examined through the following indicators: frequency, variability, importance, complexity and accuracy, assigning ratings to each on a scale of 1 to 5, which, when added up, determines the mental effort scale. For a complete picture of mental strain, points indicating the degree of monotony of work are assigned in the same way. In assessing the total mental workload, the scores are added up and the final grade is read from the table (Bridger, 2003, p. 216). The study of mental workload was carried out for each employee separately, but the results are practically no different, since the work performed in these positions is very similar and takes place under the same conditions of the material working environment. Therefore, it was decided to include the analysis of mental workload below without a breakdown by individual workstation (table 4).

Table 4.
Mental workload of an assembly plant worker

	Receiving information	Making decisions	Performing activities
Inflow frequency	1	1	1
Uncertainty	1	1	1
Variability	1	1	1
Complexity	1	1	1
Accuracy	2	1	3
Time stress	1	2	3
total	7	7	10
Total for all values	24		

Source: own study.

The issue of receiving information in the work of an assembler is not complicated, workers have clear and easy to interpret instructions. The assembly process does not change, and possible inaccuracies in information occur only when starting new production lines, when the instructions have not yet been verified in practice. The stress of receiving information quickly is also virtually non-existent, as experienced operators know their tasks practically by heart. Decision-making in each of the options listed in the table is negligible due to the uncomplicated process in which each step is explained in detail. On the other hand, execution of activities causes the greatest amount of time stress due to the need to make the daily norm or possibly translate which resulted in reduced productivity. The next element contributing to the mental stress of employees is the monotony of work, which is generated by the components listed in Table 5.

Table 5.
Monotony of work at the position of assembler

Components of monotony	Occurrence [yes/no]
Uniformity of process	Yes
Uniformity of environmental conditions	Yes
Need for constant tension of attention	No
Lack of involvement of the intellect	Yes

Source: own study.

Monotony of work at the production line manifests itself in the monotony of the process, which definitely occurs in the analyzed case. Operators repeat for the duration of one working shift, exactly the same activities about 1170 times. The same is true of the uniformity of environmental conditions, since workers perform their tasks in one place, without moving anywhere during their work. On the other hand, the need for tension of attention, another component of monotony, is no longer present, because the employees, after repeating the same activities many times during their work, already know their tasks very well, so they do not require much concentration from them. The last point, the great ease of work and the lack of intellectual involvement, is to some extent connected with the previous one. Production work is not complicated, repetitive, does not involve any variation or the need to solve problems that would force them to think outside the box.

It was possible to assess the material working environment by examining its various elements. Using a multifunction meter, measurements of humidity, lighting, temperature and noise were obtained. The reference source for determining the level of nuisance of these factors and the correct way to measure them were Polish standards. For noise level, the Polish standard PN-N-01307;9453, for illumination intensity PN-EN 12464-1;201154, for temperature PN-N-08011;8555. In the case of humidity, it is only a recommendation, which indicates values of 40-70% in summer and 30-60% in winter. Measurements at the assemblers' workstations were taken eight times during one work shift, repeated on each working day for a period of two weeks. Table 6 shows the averaged results of the measurements taken.

Table 6.
Analysis of material work environment factors

	Workstation 1	Workstation 2	Workstation 3	Workstation 4	Workstation 5
Air temperature [°C]	27,7	27,8	28,5	28,2	28,3
Humidity [%RH]	35,25	34,90	33,12	33,67	33,20
Stand illumination [LUX]	441	985	983	1002	985
Noise level [dB]	74	73,2	68,2	67,9	67,2

Source: own study.

The results obtained during the survey indicate that employees in the assembly department work in an optimized environment. The air temperature for those doing light physical work should oscillate between 14 and 28°C. Assemblers work in higher temperature ranges, unfortunately, they exceed acceptable values. As for humidity, parameters of 40 to 70% in summer are recommended, while 30 to 60% in winter. Measurements were made during the autumn and winter, so it should be considered that this parameter is also within the required standard. The noise level must not exceed 85dB, and no abnormalities were noted at any of the tested noise sites. On the other hand, the illumination in the case of the tested production line, that is, precision work, must not be lower than 750LUX, but at position 1 a much lower value than the requirement can be observed.

5. Conclusions

After a very extensive analysis of the assemblers' workstations, it was determined that there were several elements that, if changed, could improve the comfort of work, the quality of products and, above all, improve productivity. A new way of assembling contacts in the cube was proposed, which, according to the operators, significantly improved the comfort of the workstation. The cumbersome manual pushing of contacts into the cube using only the so-called "comb" and the worker's strength was replaced with a press that reduced the level of stress on the wrist. As a result, the previously felt pain in the wrist, caused by the need to overuse the operator's muscle strength at a given stage of production, has been eliminated. In addition, the press ensures greater quality repeatability of the product than manual labor.

Another of the irregularities found was that the illumination level at one of the workstations did not comply with the applicable standards. The lowest permissible illumination level for precision work is 750 lux, and measurements at workstation 1 indicated 442 lux, despite the same equipment as at workstation 2, which showed adequate parameters. The cause turned out to be a worker's deliberate disconnection of power to available lighting. The removal of this problem, thanks to the creation of ergonomic awareness among employees, resulted in the elimination of intentional and unhealthy behavior among workers. A kind of safety culture has been created, in which everyone consciously takes care of their own well-being.

The next inappropriate parameter of the material working environment was too high a temperature at the assembly stations. Admittedly, it was slightly above the permissible value. It was decided to lower the temperature being at the workstations by installing a portable air conditioner. Working at a high temperature makes the worker work more dynamically, but thus makes more mistakes and more often leads to accidents at work.

Another change implemented was the introduction of regular rotation of employees between workstations during the workday. Such a solution reduced the average mental workload on the production line, which had been occurring until then, to a low one, and this was achieved by eliminating one of the factors contributing to monotony, namely the elimination of monotony at work. This is a component, the absence of which improves the well-being of those doing the work, reduces the feeling of fatigue and the flowing decrease in productivity.

All of the above-mentioned changes have either directly or indirectly affected worker productivity. According to production records, before the introduction of ergonomic recommendations, an average of 748 pieces were made at the surveyed workstations during one shift. One month after the introduction of ergonomic solutions, the daily norms were re-examined and on average the number of products made, during one work shift, increased by 3%, or about 22 pieces.

The implementation of ergonomic research is very time-consuming. Observation of employees, making chronometry, analysis of the material environment. All this makes the execution of such a research project take a very long time. However, it is extremely necessary in order to make appropriate modifications to workstations based on the data obtained. After all, this will ensure that employees work safely, efficiently and with the least possible biological cost.

In addition to all the economic benefits that any company can see through the implementation of ergonomic solutions, undoubtedly the strengths of these measures are the improvement of employee safety, the reduction of workplace accidents, the minimization of health ailments associated with improper working conditions, increased job satisfaction, less work fatigue, and the reduction of the uniformity of the work process. These are extremely important aspects that will positively influence the formation of a culture of ergonomics and safety in the workplace.

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