World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(CASE REPORT)

Analysis of work posture using the rapid office strain assessment (rosa) method with workplace redesign for employees at pt Cisadane Raya chemicals

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World Journal of Advanced Research and Reviews, 2025, 28(03), 745–750

Publication history: Received 02 November 2025; revised on 07 December 2025; accepted on 10 December 2025

Article DOI: https://doi.org/10.30574/wjarr.2025.28.3.4124

Abstract

Optimal ergonomic implementation is essential for creating a comfortable, safe, and productive work environment. This study aimed to analyze the work posture of Health, Safety, and Environment (HSE) workers at PT Cisadane Raya Chemicals using the Rapid Office Strain Assessment (ROSA) method. The ROSA method was chosen because of its ability to identify ergonomic risks based on worker interactions with office equipment, such as chairs, monitors, keyboards, mice, and telephones. The assessment was carried out on two respondents who showed ROSA scores of 6 each, which were included in the high-risk category. Based on the results of the analysis, a workplace redesign was performed using anthropometric data from the Indonesian community and ergonomic modeling software. The redesign included adjusting the dimensions of chairs and tables and adding supporting facilities such as document holders and lockers. In addition, recommendations were provided for changes in work habits and ergonomic training to increase worker awareness of the importance of good work posture. This study shows that ROSA-based ergonomic analysis and implementation of workplace redesign can significantly reduce musculoskeletal risks and increase work comfort and efficiency of workers.

Keywords: K Ergonomics; ROSA; Work posture; Workplace redesign

1. Introduction

In the modern workplace, employee productivity and well-being are the top concerns for many companies. One important aspect that affects both is the work posture of the workers [1]. Unergonomic work postures can trigger musculoskeletal disorders (MSDs), especially in office workers who perform static activities for long periods. If not immediately addressed, these complaints have the potential to reduce work efficiency and increase long-term health risks [2][3].

Ergonomics, as a science that studies the interaction between humans and other elements in a work system, plays an important role in designing a healthy, safe, and comfortable work environment. The goal is to achieve a quality of work without ignoring aspects of health, safety, and comfort. In ergonomics, workers or humans are regulated in their activities to create a comfortable work environment. With ergonomics, employees can adjust their working positions to be more comfortable and orderly [4]. Office ergonomics is the application of ergonomics to office work, including the office work environment and work equipment used in offices, such as office furniture (chairs) and computers or desktops [5]. Office ergonomics can be defined as rules or guidelines regarding the interaction or relationship between workers and the work equipment used when performing office work [5]. One concern regarding this interaction is work posture. Work posture is a determining factor in analyzing the effectiveness of a job. If the work posture of the operator is good and ergonomic, then the results obtained by the operator will be good. However, if the operator's work posture

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is not ergonomic, the operator will easily get tired [5]. If the operator gets tired easily, the results of the work carried out by the operator will also decrease and not be as expected

One approach to evaluate ergonomic conditions in an office environment is the Rapid Office Strain Assessment (ROSA) method [4]. This method systematically assesses the interaction of workers with work equipment, such as chairs, monitors, keyboards, mice, and telephones, to identify the level of ergonomic risk [7].

This study was conducted at PT Cisadane Raya Chemicals, a company in the oleochemical industry. In company operations, administrative and production functions are integrated into one work area, creating challenges in terms of employee work posture comfort. Based on initial observations, several workers complained of discomfort while working, which was suspected to be caused by work postures that were not in accordance with ergonomic principles.

This study aimed to analyze work postures using the ROSA method and to provide workplace redesign proposals based on the results of the analysis. A thorough evaluation of current working conditions and the application of ergonomic principles in the redesign is expected to create a more ergonomic work environment, which ultimately improves worker well-being and productivity.

This study aimed to evaluate the ergonomic hazards that might result from the working postures of employees at PT Cisadane Raya Chemicals by utilizing the ROSA method. Additionally, the study seeks to redesign the workplace based on the findings from the work posture analysis using the ROSA method and to assess the effects of implementing these redesign solutions on the overall working conditions at PT Cisadane Raya Chemical

2. Material and methods

2.1. Methods

This research was conducted in the context of implementing practical work at PT Cisadane Raya Chemicals, Tangerang City, Banten. The research was carried out from February 3, 2025, to February 28, 2025, with a working hour system for practical work participants, namely 10.00–16.00 WIB from Monday to Friday.

This research will employ a Descriptive Quantitative Study utilizing an Observational Approach with a Cross-Sectional design to analyze the ergonomic risk associated with the work posture of Health, Safety, and Environment (HSE) workers at PT Cisadane Raya Chemicals. This design is chosen because the primary goal is to measure and describe the current level of risk based on observation at a single point in time, focusing specifically on the office-based computer tasks of the HSE personnel where the Rapid Office Strain Assessment (ROSA) method is applicable. The study population will include all HSE workers who regularly perform computer or administrative work. A purposive sampling technique will be used to select individuals who spend a minimum amount of time (e.g., two hours daily) at their workstations, ensuring that the data collected are relevant to chronic posture exposure. The author also uses literature to assist in conducting the analysis and discussion. Finally, the conclusion and suggestion stages were reached. The author also has the right to provide suggestions for further research that has some similarities to the author's research topic.

2.2. Data Collection

Data collection was performed to obtain the information needed to support the implementation and analysis of the research. The types of data used in this study consist of two categories:

Primary data were obtained by documenting employee work postures using photographs. Documentation was taken when employees were carrying out work activities between 10:00 and 16:00 WIB. The pictures were not taken in the morning because the researcher assumed that the physical condition of the workers was still relatively fresh at that time, so that body posture tended to be better than the conditions during the following working hours. Therefore, documentation was carried out during active working hours to obtain a more representative picture of the work posture.

Secondary data are not obtained directly through field observation but from other relevant sources. In this study, secondary data were obtained from the company's official website and scientific journals related to PT Cisadane Raya Chemicals and the research topic.

3. Results and discussion

Figure 1 shows a sample photo of the work posture and work environment of the employee. The work posture assessment in this study was carried out using the Rapid Office Strain Assessment (ROSA) method, which is divided into three main parts, namely: Part A (chair), Part B (monitor and phone), and Part C (mouse and keyboard). After obtaining the scores for each section (A, B, and C), the next step is to calculate the Monitor and Peripherals score by combining the scores from Parts B and C. The Monitor and Peripherals scores were then combined with the scores of Part A to determine the final ROSA score.

Figure 1 Work Posture

A recapitulation of the ROSA Scores from Health Safety and Environment (HSE) function workers at various workplaces of PT Cisadane Raya Chemicals is shown in Table 1.

Table 1 ROSA Score Recapitulation

Num	Name	Workplace	ROSA Score	Risk Level
1	Arik	Office	6	Dangerous
2	Teguh	Office	6	Dangerous
3	Budi	Office	6	Dangerous
4	Dion	Office	6	Dangerous
5	Ratna	Office	6	Dangerous

This study used the Rapid Office Strain Assessment (ROSA) method to evaluate the suitability of the work posture of workers in the Health, Safety, Security, and Environment (HSSE) Function at various PT Cisadane Raya Chemicals work locations. The assessment was performed to determine whether the applied work posture was classified as appropriate (not risky) or inappropriate (risky). Inappropriate work postures for long periods can cause musculoskeletal disorders (MSDs), which can affect worker health and productivity.

Based on the results of data collection and processing that have been carried out, researchers formulated a proposal for improvement in the form of product redesign and work area layout. This redesign was compiled by referring to anthropometric data of the Indonesian population obtained from the semutometriindonesia.org site and adjusted to existing conditions in the field. The purpose of this redesign was to improve the ergonomic suitability of the work environment to minimize the risk of musculoskeletal disorders. The following image presents a new layout design for several work areas at PT Cisadane Raya Chemicals

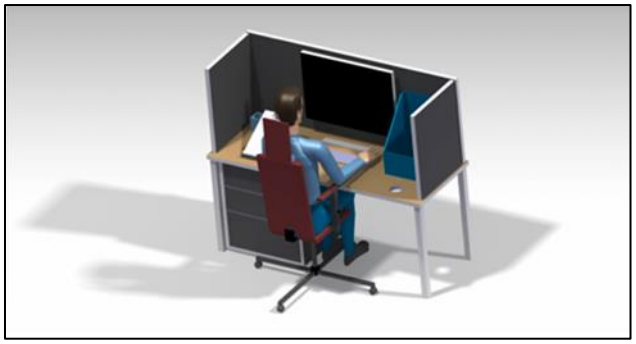

Figure 2 Workplace Layout Redesign

It can be observed that the work posture and facility completeness were adequate. The available facilities include document holders, file boxes, keyboards, mice, stationery boxes, cup holders, lockers, sockets, computers without CPUs, chairs, and tables that have been adjusted to the anthropometric data of the Indonesian people and the needs of workers.

Figure 3 Chair Redesign

Based on the design of the workplace chair created using Catia software (Figure 3), this chair was designed with reference to the anthropometric measurements of Indonesian people. The height of the chair back was adjusted to the shoulder height dimension in a sitting position (D10) 95th percentile, the width of the chair back referred to the shoulder side width dimension (D17) 95th percentile, the width of the chair seat referred to the hip width dimension (D19) 95th percentile, and the length of the chair seat was adjusted to the popliteal length dimension (D14) 95th percentile.

The seat height refers to the 5th percentile popliteal height dimension (D16), whereas the armrest height uses the 5th percentile elbow height dimension in a sitting position (D11). The armrest length was adjusted to the 95th percentile forearm length (D23), and the headrest height was obtained from the difference between the upright body height (D1) and the 95th percentile shoulder height (D3).

In addition, the height of the armrest, height of the seat, and position of the seat (forward/backward) can be adjusted according to user comfort. This chair is also equipped with cushions on the neck and waist to provide adequate support and reduce the risk of fatigue.

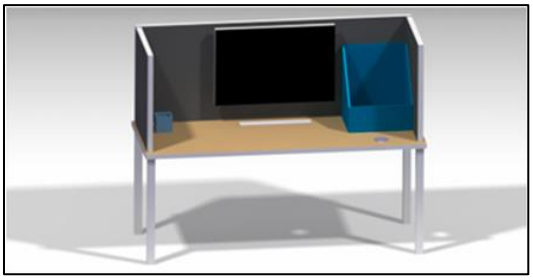

Figure 4 Table Redesign

Based on the design of the work desk created using CATIA software (Figure 4), this desk was designed with reference to the anthropometric data of Indonesian people. The height of the desk was adjusted to the height dimension of the vertebral bone (D6) of the 95th percentile, the width of the desk followed the length of the arm span to the side (D32) of the 95th percentile, and the length of the desk referred to the length of the arm span forward (D24) of the 95th percentile.

In addition, several additional facilities are included in the design of this table, including a file box for storing documents, a computer without a CPU, a monitor equipped with an adjustable feature so that its height can be adjusted to the eye level, a cup holder to prevent spills that can damage electronic devices or important documents, and a stationery box to make it easier to find stationery. There is also a power outlet under the monitor that is equipped with a cover to prevent dust from entering, as well as partitions on the right, left, and front of the table to maintain privacy and help workers focus on the task in front of them.

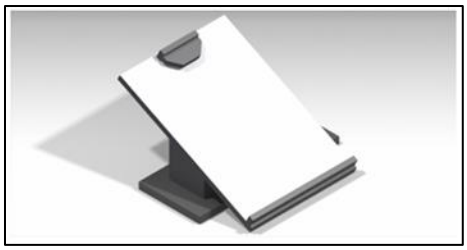

Figure 5 Document Holder Redesign

Based on the document holder design created using Catia software, as shown in Figure 5, this facility is added to facilitate the storage of documents that are being used or important documents so that they are easier to find. The recommended document holder is an in-line model. In addition, the position of the document holder can be adjusted to increase user comfort.

Figure 6 Document Holder Redesign

Based on the locker design at the workplace that has been created using Catia software, as shown in Figure 6, this facility is added to store various workers' belongings. The locker consists of three shelves, one of which is equipped with a lock so that it can be used to store valuables or confidential documents belonging to workers. However, based on the results of the observations, the distribution of these lockers is still uneven, causing some workers not to get lockers.

4. Conclusion

Based on the results of the work posture assessment using the Rapid Office Strain Assessment (ROSA) method on two workers, it is known that both workers in the Health Safety & Environment (HSE) Function at PT Cisadane Raya Chemicals obtained a score of >5, which is included in the high-risk category and requires immediate review. Therefore, improvements in the work area are necessary.

The solution to redesign the workplace was based on the results of the work posture analysis using the Rapid Office Strain Assessment (ROSA) by redesigning the workplace. The redesign of this workplace was guided by anthropometric and percentile data. The chairs need to be adjusted to accommodate the height and width of the backrest, the width and length of the seat, the height of the seat and armrest, the length of the armrest, as well as the height of the headrest and shoulder. Additionally, the table's height, width, and length must be modified accordingly.

Additional improvements that need to be implemented include stretching every 45 min, implementing the 20-20-20 rule to maintain eye health, optimal physical environment settings with room temperatures between 24°C and 27°C, lighting levels of 300 lx, and a maximum noise level of 85 dB. In addition, training related to Law No. 13 of 2003 concerning Manpower is required.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare that they have no known financial, personal, or professional conflicts of interest that could have influenced the work reported in this manuscript.

Statement of ethical approval

This work complies with all applicable ethical standards, including research integrity, proper acknowledgment of sources, and adherence to relevant institutional and publication guidelines. All procedures were conducted responsibly and with respect for academic and professional norms.

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