Analysis of Posture Work in the Ship Hull Division in Makassar Shipping Industry: RULA and REBA Method Approach

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Abstract

This research aimed to evaluate work posture values in the ship hull repair division of PT. ABC and to offer recommendations for improving less safe postures. Utilizing the REBA and RULA methods, the study conducted a quantitative analysis of worker postures in the cutting and welding sections. The REBA method identified a final score of 10 for cutting activities, indicating a high-risk posture that necessitates immediate corrective action. This score was derived from observations of neck, trunk, and leg postures during cutting, which revealed prolonged static positions. The RULA method, on the other hand, produced a final score of 6, denoting an action level 3, suggesting that changes should be implemented promptly to address observed issues. The analysis showed that both methods flagged the postures involving prolonged bending and twisting as high risk for musculoskeletal disorders (MSDs). These findings highlight a significant misalignment with ergonomic best practices, underscoring the urgent need for ergonomic interventions. To mitigate the risk of MSDs, the study recommends implementing regular posture breaks and establishing standard operating procedures (SOPs) for cutting and welding tasks at PT. ABC.

Keywords: RULA, REBA, work posture, MSDs.

1. Introduction

The shipbuilding industry in Indonesia is developing quite rapidly. One of the players in the industry is PT. ABC, which is a shipbuilding company owned by the Indonesian government, the

headquarter of which is in Makassar, South Sulawesi. Data collection was conducted at PT ABC, a company engaged in fishing vessels, passenger ships, ferries, cargo, and vessels for various related industries.

In the operation of a ship as a means of transportation, it will go through various conditions, both caused by natural factors and caused by environmental conditions. This can result in the ship experiencing damage to its construction and ship equipment as the supporting items in its operation. In ship maintenance and repair work, the frequency of work is sometimes very high, resulting in ship maintenance and repair work that often almost reach the same level as building a new ship. As a consequence, the repair process also requires quite a lot of time and energy.

The production and ship repair processes that are carried out often require the workers to work according to the planned work targets. This research discusses the ship repair process in the ship hull division. The work carried out by workers includes cutting and welding plates, connecting the pieces that have been made, and assembling them on the ship. Every day the workers work an average of 7-8 hours per day where the workers work in standing, bending, and squatting positions as well as doing other activities according to the components that are assembled and are carried out repeatedly for quite a long time. As a result, the workers often quickly feel tired when doing their work and experience soreness in certain parts of their body during their work. The workers who work on ship repairs are eight workers, consisting of four workers in the cutting section and four workers in the welding section with an age range of 35-45 years.

Several previous studies have conducted research related to work fatigue, work posture, and MSDs (Musculoskeletal Disorders) risks (Bukhori, 2010; Priyono, 2014; Rahmawati, 2021; Siska and Teza, 2012). Additionally, Nurfajriahand Arifati (2018) proposed that there are two work postures that are classified as moderate risk in the sense that changes may be required to improve work postures. In addition, there are two work postures that are classified as high risk, which means that they are very dangerous for the musculoskeletal system and need improvement immediately. This is influenced by unnatural body posture (hunching over, bending neck down, stretching arms away from the body), repetitive activities, muscle use, and excessive use of energy. In regard to the occurring phenomenon, this research was carried out with the aim of discovering the score of work posture values in the ship hull repair division and providing recommendations from the less safe posture values when working in the ship hull division of PT. ABC.

2. Method
The respondents in this study were workers at PT. ABC which is located in Makassar City. The data collection was carried out for 1 month. This research is quantitative, namely by applying the REBA and RULA methods to determine the posture conditions of workers in the cutting and welding section of the ship hull. The data analysis carried out in this research are as the following:

1. Observing the workers while working and taking documentation in the form of photos which will be used to assess the posture using the REBA and RULA methods.
2. Measuring the body posture based on the angles when working and determining the scores on the REBA and RULA tables.
3. Providing additional load scores according to the weight of the load when working.
4. Determining the risk level on the final REBA and RULA scores.
5. Providing suggestions for improvements at high risk levels while working.

Rapid Entire Body Assessment (REBA) is a method that can be utilized to analyze work posture (Suma'mur, 1989; Tarwaka 2004; Nurmianto, 2004; Nurmianto et al., 2020). In REBA method, body segments are divided into two groups, namely group A and group B. Group A consists of the back (trunk), neck, and legs. Meanwhile, group B consists of the upper arm, lower arm, and wrist (Middles worth, 2013). Rapid Upper Limb Assessment (RULA) is a method developed in the field of ergonomics that investigates and assesses the work position carried out by the upper body (Kroemer et al., 1994; Sari et al., 2019). This method does not require special equipment to carry out assessments of the posture of the neck, back, and upper body, in line with muscle function and the external load supported by the body. In addition, RULA also considers the load and displacement carried out in its assessment and assesses whether the foot position is stable or not. Assessments using RULA require little time to complete and carry out general scoring on a list of activities that indicate a reduction in risk due to physical lifting carried out by the operator (Masitoh, 2016).

3. Results
3.1 Analysis of work posture of the cutting section workers using REBA and RULA
Figure 1 displays a picture of body posture of the worker. After measuring and determining the angles, REBA and RULA measurements are performed according to the posture during cutting activities exhibited in the figure.

Figure 1. Posture of worker 1 in the cutting section

Table 1. REBA and RULA scores for worker 1 in the cutting section

REBA		RULA	
Body Posture	Final score	Body Posture	Final score
Neck	2	Upper arms	3
Trunk	3	Lower arms	2
Legs	3	Wrist	3
Upper arms	4	Wrist twist	1
Lower arms	2	Neck	3
Wrist	2	Trunk	3
Final score of table A posture	7	Legs	1
Final score of table B posture	6	Final score of table A	5
Final score of table C posture	9	Final score of table B	5
Final REBA scores	10	Final score of table C	6

Table 1 displays the scoring table for body posture of worker 1during cutting activities. The calculation results of REBA scores obtained from observing the posture of the neck, trunk, and legs during the cutting activity were inserted into table A. After obtaining the results from Table A which produceda score of 6, the score result was added with the additional load score. From the measuring activity, the load was carried out repeatedly so that the score was +1. Therefore, the final score in table A was 7. Meanwhile, the scores obtained from observing the posture of the upper arm, lower arm, and wrist in the measuring activity were written down into table B. Based on the scores obtained from the result of observation on the upper arm, lower arm, and wrist during the measuring activities, the score of 6 was obtained, which is included in good category, which means proper grip, strong in the middle and strong grip. After entering the final scores of table A and table B into table C, the final score of cutting activity, which was 9, was obtained. Since the worker's position was by bending his neck down and the activity was causing static body parts to be held for more than one minute, the activity received an activity score of +1. As a result, the final REBA score was 10.This score shows action level 4, meaning high level, which indicates immediate corrective action is a necessity.

The calculation of RULA scores obtained from observations of the upper arm, lower arm, wrist, and wrist twist during the cutting activity was entered into table A. After obtaining the results of the table A which resulted in a score of 4, then the score result was added with a muscle use score of +1 because the posture was maintained for one minute and added with a load use score of +0 because the load was less than 2 kg and was held. Therefore, the total score was 4+1+ 0 = 5. Meanwhile, table B shows the results of observation to worker 1 in cutting activities. The scores obtained from observing the posture of the neck, trunk, and legs were inserted into table B. As a result, a score of 4 was obtained, which then was added with the muscle use score of +1 because the posture was maintained for one minute and added with load use score of +0 because the load was less than 2 kg and was held. Therefore, the final score was 4+1+0 = 5. After that, the determination of final score to obtain the action level value and the actions that must be taken for work posture of worker 1's body was carried out by entering the final scores of table A and B

into table C. The final score obtained was 6, which refers to action level 3, indicating that examinations and changes must be carried out immediately.

Figure 2. Posture of worker 2in the cutting section

Table 2. REBA and RULA values for worker 2 in the cutting section

REBA		RULA	
Body Posture	Final score	Body Posture	Final score
Neck	3	Upper arms	4
Trunk	4	Lower arm	2
Legs	1	Wrist	3
Upper arms	5	Wrist twist	1
Lower arm	2	Neck	4
Wrist	3	Trunk	4
Final score of table A posture	7	Legs	1
Final score of table B posture	8	Final score of table A	5
Final score of table C posture	10	Final score of table B	5
Final REBA scores	11	Final score of table C	7

Table 2 presents the scoring table for body posture of worker 2 during cutting activities. The calculation results of the REBA score that can be obtained from observing the posture of neck, trunk, and legs during the cutting activity were inserted into table A. The results in Table A showed that a score of 6 was obtained. Then, the score was added to the additional load score. From the measuring activities, the load was carried out repeatedly so that the score was +1. Therefore, the final score in table A was 7. Meanwhile, in table B, the scores obtained from observations of the upper arms, lower arms, and wrist during the cutting activity was obtained with a score of 8, which is included in good category, suggesting that it is aproper grip, strong in the middle and a strong grip. After writing down the total scores of table A and table B into table C, the final score for the cutting activity, which was 10, was obtained. Because the worker's position was bending down his neck and the activity caused the body part to be static and held for more than one minute, the activity got an activity score of + 1. As a result, the final REBA

score was 11, which is included inaction level 4, meaning a very high level, suggesting that corrective action must be carried out immediately.

The calculation of RULA scores that can be obtained from the results of observations of the upper arm, lower arm, wrist, and wrist twist during the cutting activity was inserted into table A. The result in table A showeda score of 4. Then, the score was added with a muscle use score of +1 because the posture was maintained for one minute and added with a load use score of +0 because the load was less than 2 kg and was held. Therefore, the total score was 4+1+0 = 5. Meanwhile, table B contains the results of scoring for worker 2 on cutting activities. The score obtained from observing the posture of the neck, trunk, and legs, which was 4, was written down into table B. Then, the score was added with the muscle use score of +1 because the posture was maintained for one minute and also added with a load usage score of +0 because the load was less than 2 kg and was held. As a result, the total score was 4+1+0 = 5. Next, the determination of the final score to obtain the action level value and the actions that must be carried out for the body posture of worker 2 was performed by entering the scores into table C the result of which was a score of 7, which shows action level 4 indicating that this condition is dangerous. Therefore, examination and changes are required immediately (at that moment).

Figure 3. Posture of worker 3 in the cutting section

Table 3. REBA and RULA scores for worker 3 in the cutting section

REBA		RULA	
Body Posture	Final score	Body Posture	Final score
Neck	3	Upper arm	3
Trunk	4	Lower arm	1
Legs	1	Wrist	1
Upper arm	4	Wrist twist	1
Lower arm	1	Neck	4
Wrist	1	Trunk	4
Final score posture table A	7	Legs	1
Final score posture table B	6	Final score table A	4
Final score posture table c	8	Final score table B	8
Final REBA scores	9	Final score table C	6

Table 3 exhibitsthe scoring table for the body posture of worker 3 during cutting activities. The calculation results of the REBA scores that can be obtained from observing the posture of the neck, torso, and legs during the cutting activity were entered into table A. From the results in table A,a score of 6 was obtained. Then, the score result was added with the additional load score. From the measuring activity, the load was carried out repeatedly so that the score was +1. Therefore, the final score in table A was 7. Meanwhile, the score in table B was obtained from observations of the upper arm, forearm and wrist. From the measuring activity, a score of 6 was obtained, whichis included in good category, meaning that it is aproper grip, strong in the middle and strong grip. After entering the final scores of table A and table B into table C, the final score of cutting activity, which was 8, was obtained. Since during the work the worker's position was static and held for more than one minute, the activity got an activity score of +1. Therefore, the total REBA score was 9, which indicates action level 3, meaning high level, which suggests corrective action is a necessity.

The calculation of RULA scores that can be obtained from the results of observations of the upper arm, lower arm, wrist, and wrist twist during the cutting activity was inserted into table A. The result in Table A showeda score of 3. Then, the result of the score was added with a muscle use score of +1 because the posture was maintained for one minute and added with a load use score of +0 because the load was less than 2 kg and was held. Therefore, the final score of table Awas 3+1+0 = 4. Meanwhile, in table scoring B for worker 3 on cutting activities, the scores obtained from observing the posture of the neck, trunk, and legs, resulting in a score of 7, were entered into table B. Then, the score result was added with a muscle use score of +1 because the posture was maintained for one minute and added with a load use score of +0 because the load was less than 2 kg and was held. Therefore, the final score of table Bwas 7+1+0 = 8. Next, the determination of the final score to obtain the action level value and the actions that must be carried out for work posture of worker 3 was performed by entering the scores into table C,

where a score of 6 was obtained. Therefore, the score shows action level 3, indicating that examination and changes are necessitated to be carried out immediately.
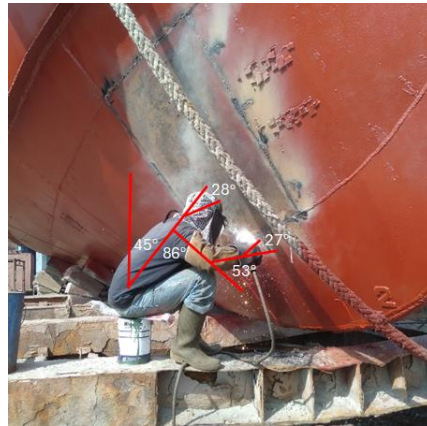

Figure 4. Posture of worker 4 in the cutting section

Table 4. REBA and RULA scores for worker 4 in the cutting section

REBA		RULA	
Body Posture	Final score	Body Posture	Final score
Neck	3	Upper arms	4
Trunk	4	Lower arm	2
Legs	3	Wrist	3
Upper arms	4	Wrist twist	1
Lower arm	2	Neck	3
Wrist	2	Trunk	4
Final score posture table A	9	Legs	1
Final score posture table B	6	Final score table A	5
Final score posture table c	10	Final score table B	6
Final REBA scores	11	Final score table C	7

Table 4 displays the scoring table for body posture of worker 3 during cutting activities. The calculation of the REBA scores can be obtained from observing the posture of the neck, trunk, and legs during the cutting activity, which was then entered into table A. The result of Table A showeda score of 8, which was added with the additional load score. Since in the measuring activity the load was carried out repeatedly, the score was +1. Therefore, the final score in table A was 9. Meanwhile, the scores obtained from observing the posture of the upper arm, forearm and wrist in the measuring activity were inserted into table B, resulting in a score of 6, which is included in good category, meaning that it is proper grip, strong in the middle and strong grip. After putting the final scores of table A and table B into table C, the final score of for the cutting activity, which was 10,was obtained. Since the worker's position was static and was held for more than one minute, the activity got an activity score of +1. As a result, the total REBA score

was 11, which refers to action level 4, meaning a very high level, suggesting that corrective action needs to be taken immediately at that moment.

The calculation of RULA scores that can be obtained from the results of observation of the upper arm, lower arm, wrist, and wrist twist during the cutting activity were entered into table A. The result intable A showeda score 4. Then, the score result was added with a muscle use score of +1 because the posture was maintained for one minute and added with a weight use score of +0 because the load was less than 2 kg and was held so that the final score of table A was 4+1+0 = 5. In the scoring table B for worker 3 on cutting activities, the scores obtained from observing the posture of the neck, trunk, and legs were entered into table B, resulting in ascore of 5. Then, the score result was added with the muscle use score of +1 because the posture was maintained for one minute and added with a load use score of +0 because the load was less than 2 kg and was held so that the final score was 5+1+0 = 6. After that, the determination of final score to obtain the action level value and the actions that must be taken in the body posture of worker 4 was carried out by entering the scores into table C, resulting in a score of 7, which shows the action level 4, indicating that this condition is dangerous. Therefore, examination and changes are required immediately at that moment.

3.2 Analysis of work posture of the welding section workers using REBA and RULA
Figure 5 displays a picture of the body posture of a worker after measuring the angles. After that, REBA and RULA measurements are carried out based on the posture during welding activities shown in the figure.

Figure 5. Posture of worker1in the welding section

Table 5. REBA and RULA scores for worker 1 in the welding section

REBA		RULA	
Body Posture	Final score	Body Posture	Final score
Neck	3	Upper arms	5
Trunk	3	Lower arm	2
Legs	1	Wrist	3
Upper arms	5	Wrist twist	1
Lower arm	2	Neck	4
Wrist	2	Trunk	3
Final score posture table A	6	Legs	1
Final score posture table B	8	Final score table A	7
Final score posture table c	9	Final score table B	7
Final REBA scores	10	Final score table C	7

Table 5 presents the scoring of body posture of worker 1 during welding activities. The calculation of the REBA scores that can be obtained from observing the posture of the neck, trunk, and legs during the cutting activity were entered into table A. From table A, the result showeda score of 5 which was then added with the additional load score. Since the welding activity was carried out repeatedly, the score was +1.As a result, the score in table A was 6. Next, the scores obtained from observing the posture of the upper arm, lower arm, and wrist in the welding activity were entered into table B, resulting ina score of 8, which falls into good category, which indicates proper grip, strong in the middle and strong grip. After entering the final scores of table A and table B into table C, the final score of the welding activity, which was 9, was obtained. Since the worker's position was static and was maintained for more than one minute, the activity got an activity score of +1. Therefore, the total REBA score was 10, which is included in action level 3, meaning high level, suggesting that immediate corrective action is required.

The calculation of RULA scores that can be obtained from the results of observations of the upper arm, lower arm, wrist, and wrist twist during the welding activity were inserted into table A. From table A, the result showeda score of 6 which was then added with a muscle use score of +1 because the posture was maintained for one minute and added with a weight use score of +0 because the load was less than 2 kg and was held. Therefore, the total score was 6+1+0 = 7. Meanwhile, in table B, based on the scores obtained from the observation results on the neck, trunk, and legs during welding activity, a score of 6 was obtained. Then, the score result was added to the muscle use score of +1 because the posture was maintained for one minute and added with a load usage score of +0 because the load was less than 2 kg and was held so that the total score was 6+1+0 = 7. After that, the determination of final score to obtain the action level value and the actions that must be taken for the body posture of worker 1 was carried out by entering the scores into table C, the result of which was7, indicating that this condition is dangerous, so examination and changes are required very immediately at that moment.
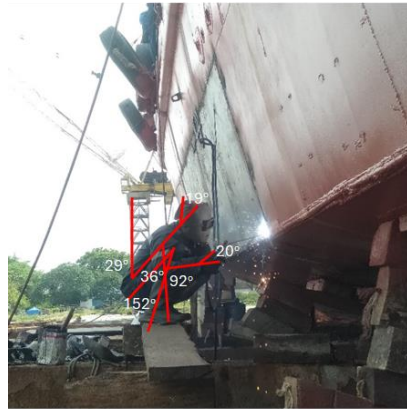
Figure 6. Posture of worker 2 in the welding section

Table 6. REBA and RULA scores for worker 2 in the welding sections

REBA		RULA	
Body Posture	Final score	Body Posture	Final score
Neck	3	Upper arms	3
Trunk	4	Lower arm	1
Legs	3	Wrist	3
Upper arms	4	Wrist twist	1
Lower arm	2	Neck	2
Wrist	2	Trunk	3
Final score posture table A	9	Legs	1
Final score posture table B	6	Final score table A	5
Final score posture table c	10	Final score table B	5
Final REBA scores	11	Final score table C	6

Table 6 shows the scoring of body posture of worker 2 during welding activities. The REBA score calculation that can be obtained from observing the postures of the neck, trunk, and legs during the welding activity was entered into table A. The result in table A showed a score of 6 which then was added with the additional load score. Since the welding activity was carried out repeatedly, the score was +1. As a result, the score in table A was 7. Meanwhile, the scores obtained from observing the posture of the upper arm, lower arm, and wrist in the welding activity were entered into table B, which resulted in a score of 6 which falls into good category, indicating that it is proper grip, strong in the middle and strong grip. Next, after entering the final scores of table A and table B into table C, the final score of 7 for the welding activity was obtained. Since the worker's position was bending down his neck and the activity caused the static part of the body to be held for more than one minute, the activity got an activity score of + 1. Therefore, the final REBA score was 8, which shows action level 3, which means high level, suggesting that immediate corrective action is necessitated.

The calculation of RULA scores that can be obtained from the results of observation of the upper arm, lower arm, wrist, and wrist twist during the welding activity were entered into table A, the result of which was a score of 4. Then, the score result was added with a muscle use score of +1 because the posture was maintained for one minute and also added with a weight use score of +0 because the load was less than 2 kg and was held so that the final score was 4+1+0 = 5. Meanwhile, in table B, based on the scores from the results of observation on the neck, trunk, and legs during the welding activity, a score of 4 was obtained. Next, the score was added with the muscle use score of +1 because the posture was maintained for one minute and added with a load use score of +0 because the load was less than 2 kg and was held so that the final score was 4+1+0 = 5. Next, the determination of final score to obtain the action level value and the actions that must be taken on the body posture of worker 2 was carried out by entering the scores into table C which resulted in a score of 6. Therefore, the score shows action level 3, indicating that examination and changes need to be carried out immediately.

Figure 7. Posture of worker 3 in the welding section

Table 7. REBA and RULA scores for worker 3 in the welding section

REBA		RULA	
Body Posture	Final score	Body Posture	Final score
Neck	3	Upper arms	1
Trunk	4	Lower arm	2
Legs	3	Wrist	3
Upper arms	4	Wrist twist	1
Lower arm	2	Neck	3
Wrist	2	Trunk	2
Final score posture table A	9	Legs	1
Final score posture table B	6	Final score table A	4
Final score posture table c	10	Final score table B	4
Final REBA scores	11	Final score table C	4

Table 7 displays the scoring of body posture of worker 3 during welding activities. The calculation of the REBA score obtained from observing the posture of the neck, trunk, and legs during the welding activity was entered into table A. The result in table A showed a score of 3 which was then added with the additional load score. Since the welding activities were carried out repeatedly, the score was +1. Therefore, the score in table A was 4. Meanwhile, in table B, the score obtained from the results of observation of the upper arm, lower arm, and wrist during measuring activities showed a score of 6, which is included in good category, meaning that it isa proper grip, strong in the middle and strong grip. After entering the total scores of table A and table B into table C, the final score for the welding activity, which was 4,was obtained. Since the worker's position was bending the neck down and the activity caused the static part of the body to be maintained for more than one minute, the activity received an activity score of +1. Therefore, the final REBA score was 5, which shows action level 4, which is included in medium level, indicating that corrective action is necessitated.

The calculation of RULA scores that can be obtained from the results of observations of the upper arm, lower arm, wrist, and wrist twist during the welding activity was entered into table A. The result of table A showeda score of 3. Then, the score result was added with a muscle use score of +1 because the posture was maintained for one minute and added with a load use score of +0 because the load was less than 2 kg and was held. As a result, the final score was $3+1+0 = 4$. In table B, based on the scores obtained from the results of observation on the neck, trunk, and legs during the welding activity, a score of 3 was obtained. Then, the score result was added with the muscle use score +1 because the posture was maintained for one minute and added with a load usage score of +0 because the load was less than 2 kg and was held. Therefore, the final score was $3+1+0 = 4$. Next, the determination of final score to obtain the action level value and the actions that must be taken for the body posture of worker 3wascarried out by entering the scores into table C,resulting in a score of 4, which shows action level 2, indicating that further examination is required besides the necessary changes.

Figure 8. Posture of worker 4 in the welding section

Table 8. REBA and RULA scores for worker 4 in the welding section

REBA		RULA	
Body Posture	Final score	Body Posture	Final score
Neck	3	Upper arms	2
Trunk	4	Lower arm	1
Legs	3	Wrist	3
Upper arms	4	Wrist twist	1
Lower arm	2	Neck	4
Wrist	2	Trunk	2
Final score posture table A	9	Legs	1
Final score posture table B	6	Final score table A	4
Final score posture table c	10	Final score table B	6
Final REBA scores	11	Final score table C	6

Table 8 displays the scoring of body posture of worker 4 during welding activities. The calculation of the REBA score obtained from observing the posture of the neck, trunk, and legs during the welding activity was entered into table A. From the results in table A, a score of 6 was obtained. Then, the score result was added with the additional load score. Since the welding activity was carried out repeatedly, the score was +1. Therefore, the final score in table A was 7. In table B, based on the scores obtained from the results of observation of the upper arm, lower arm, and wrist during the measuring activity, a score of 2 was obtained, which is included in good category, meaning that it is proper grip, strong in the middle and strong grip. After entering the final scores of table A and table B into table C, the final score of 7 for the welding activity was obtained. Since the worker's position was maintained with a static body part to be maintained for more than one minute, the activity received an activity score of +1. Therefore, the final REBA score was 8, which shows action level 3, meaning high level, suggesting that immediate corrective action is required.

The calculation of RULA scores that can be obtained from the results of observation of the upper arm, lower arm, wrist, and wrist twist during the welding activity was entered into table A. The results of table A showeda score of 3, which then was added with a muscle use score of +1 because the posture was maintained for one minute and added with a load use score of +0 because the load was less than 2 kg and was held. Therefore, the final score was 3+1+0 = 4. In table B, based on the scores obtained from the results of observation on the neck, trunk, and legs during the welding activity, a score of 5 was obtained. Then, the score result was added with the muscle use score of +1 because the posture was maintained for one minute and added with a load use score of +0 because the load was less than 2 kg and was held. Therefore, the final score was 5+1+0 = 6. Next, the determination of final score to obtain the action level value and the actions that must be taken in the body posture of worker 4 was carried out by entering the scores into table C that resulted in a score of 6, which shows action level 3, indicating that examination and changes need to be carried out immediately.

4. Discussion

From the results of identifying the work postures of PT. ABC ship hull workers where there are cutting and welding activities, the highest REBA score was obtained at level 4 which indicates very high risk and the highest RULA score was at level 4 which indicates dangerous conditions suggesting that examination and changes must be carried out very immediately. The results of our study reveal that the work postures of ship hull workers predominantly involve prolonged bending and twisting, which are known to contribute to musculoskeletal strain. The identified work postures are associated with an increased risk of musculoskeletal disorders (MSDs), which aligns with the literature suggesting that repetitive and strenuous postures significantly impact worker health. The study underscores the need for ergonomic interventions, as the current postures observed among ship hull workers do not align with best practices for minimizing physical stress and injury risk. Therefore, in this study, the researchers recommend the cutting and welding workers to take a break to change their posture to a normal position when working so as to minimize the occurrence of muscle injuries. In addition, it is also expected that there will be an SOP for cutting and welding work procedures of ship hulls at PT. ABC.

5. Conclusion

In conclusion, the application of the RULA and REBA methods to analyze posture work in the Ship Hull Division of the Makassar Shipping Industry has provided significant insights into ergonomic risks and areas for improvement. The findings reveal that current postural practices may contribute to musculoskeletal strain, highlighting the need for targeted ergonomic interventions. By addressing the identified high-risk postures and implementing recommended changes, the industry can enhance worker safety and efficiency. This study underscores the importance of regular ergonomic assessments and continuous improvement in workplace design to mitigate potential health risks. Future research could build on these findings by exploring the impact of specific ergonomic interventions on reducing injury rates and improving overall worker well-being.

6. Acknowledgments

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