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A Postural Risk Assessment of Steamer Production Workers Using RULA And REBA

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ABSTRACT

The present study examined the work posture of the worker as a basis for correcting bad postures in the workplace. Rapid Upper Limb Assessment (RULA) and Rapid Entire Body Assessment (REBA) methods are applied to evaluate the postural risk assessment which is related to musculoskeletal disorders (MSDs). There are five workers at UD. Sidoarjo National Ship is chosen to analyze the risk posture for this study. Based on observations and calculations at UD. Sidorajo National Ship, it was found that workers were still using less than optimal methods or not supported by ergonomic workstations. The study reveals that every worker in UD. Sidoarjo National Ship workstations have a risk of getting MSDs. These indicated that the worker's work posture was less ergonomic and required changes to lessen the risk of MDSs.

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1. INTRODUCTION

In the manufacturing industry, the production process becomes a crucial process for business operations. The production process will determine whether the business enhances or fails. Every business owner in the manufacturing industry expects the production process to run continuously, so they can achieve the target (Tiogana and Hartono, 2020). In achieving a continuous process, both machines and workers must work for a long time. The use of workers over a long period must be supported by ideal workstations and posture. Unlike machines, humans can get injured if the posture they use to work is not ergonomic. These problems occur in small-scale industries, especially in developing countries such as Indonesia. Small-scale manufacturing industries in Indonesia still use labor to work. Based on the perception of some small manufacturers, humans are considered cheaper than using automated machines. In the use of labor, companies often do not pay attention to the injuries that will arise. One of them is the problem that arises due to repeated processes with bad posture. This can cause musculoskeletal disorders in factory workers (Singh et al., 2014).

Many small-scale industries in Indonesia still do not understand the importance of good posture at work. Using assessment, preventive measures can be used to prevent work-related muscular disorders (WMSD) from occurring.

Several methods are used to identify processes that can cause MSD, it was the direct method, self-report, and observation methods. In this study, we use the observation method using Rapid Upper Limb Assessment (RULA) and Rapid Entire Body Assessment (REBA). The advantage of the observation method is cost-effectiveness

(Widyanti, 2020). RULA will focus on analyzing potential posture risks to the work that uses the upper body, whereas REBA will be used to analyze work that uses the whole body. Both of these assessments will help us to analyze the risk level of the process that can cause WMSD.

Work methods and workstations must have a good design so that workers have an ergonomic posture when working. Failure to maintain an ergonomic posture can result in working in a bad position. Workers often work long hours on a single job. Doing work for a long time without being supported by natural body positions can cause injuries to workers known as WMSD.

There is a strong relationship exists between workers' work positions and musculoskeletal disorders (Jajulita and Paskarini, 2015). Unergonomic work postures, in which most workers rely on squatting, bending, and prone positions for long periods, cause musculoskeletal discomfort. This unnatural work posture is generally caused by a mismatch between task requirements, work tools, and workplace characteristics, as well as the capabilities and limitations of workers.

In this study, we are going to analyze the posture of workers at UD. Sidoarjo National Ship. UD. Sidoarjo National Ship is a manufacturing company that produces kitchen cookware such as steamer pans in many sizes. Based on observations at UD. Sidorajo National Ship, it was found that workers were still using less than optimal methods or not supported by ergonomic workstations (tables or chairs). Working in these conditions for long periods may result in worker injuries, such as WMSD. In this company, we observe the critical workstations that need concern and priorities of problem-solving, six stations work on each part of the steamer which includes the aluminum cutting station, the steamer body manufacturing station, the filter production station, the handling station for a steamer, the pad installation station, and the packing station.

In the previous research, there were several research variables that used RULA and REBA to analyze work posture. Analysis of work postures that are not ergonomic using REBA can determine the level of risk, which is used to make improvements to worker posture (Sulaiman & Purnama, 2016). It is also possible to analyze the hazard level of worker posture, using independent variables, namely interview guidelines, recording devices, and body map questionnaires (Hunusalela et al., 2021). RULA and REBA analysis provide information regarding the level of danger from workers' postures (Tiogana & Hartono, 2020). The position of this study with existing research is analyzing work postures at UD. National Ship to be more ergonomic to avoid WMSD for workers at the workstation.

2. LITERATURE REVIEW

2.1. Work-related musculoskeletal disorders (WMSD)

WMSD is a problem commonly experienced by workers. Work-related musculoskeletal disorders (WMSD) are conditions affecting the musculoskeletal system, primarily caused by the performance of work tasks and the work environment (Govaerts et al., 2021). WMSD can result from repetitive movements, awkward postures, and excessive exertion during work (Santos J et al., 2016). It affects the muscles, bones, and joints (Anwer et al., 2021). Common examples of WMSD include carpal tunnel syndrome, tendonitis, and back pain. If not properly treated, these conditions can lead to pain, disability, reduced work capacity, and limitations in daily living. WMSD is also associated with the duration of work. The longer someone works, the higher the likelihood of experiencing WMSD (Siddiqui et al., 2021). The likelihood of WMSD can be assessed by measuring the risk value in a particular job. The risk value is related to the heavy load lifted and the bent working position (Laithaisong et al., 2021). Damage caused by exposure to problematic work environments can negatively affect the employment potential of workers (WHO, 2022) and could lead to a high cost for the business owner.

2.2. Cornell Musculoskeletal Discomfort Questionnaires (CMDQ)

The Cornell Musculoskeletal Discomfort Questionnaire (CMDQ) was developed as a tool for evaluating musculoskeletal discomfort, particularly in the context of work-related activities. It involves a series of questions that cover the prevalence of musculoskeletal pain, its severity levels, and its impact on the respondents' performance (Pratama et al., 2019). This questionnaire plays a vital role in both ergonomic research and occupational health, with the primary goal of identifying and comprehending the prevalence of musculoskeletal disorders (MSDs) within diverse populations. The collected data is then multiplied to generate the CMDQ score. The highest CMDQ score indicates the body part that most frequently experiences pain or discomfort (Salleh, et al., 2020).

To cater to the varied nature of musculoskeletal discomfort, CMDQ organizes the questionnaire into specific forms tailored to different groups. These specialized forms accommodate sedentary workers, standing workers, and individuals experiencing hand-related symptoms (Hedge et al., 1999). Questionnaires derived from the CMDQ can be employed to assess the level of discomfort, providing a comprehensive overview of musculoskeletal discomfort, particularly for practical activities (Salleh et al., 2020). This questionnaire consists of four sections and is tailored for assessing both male and female participants engaging in both standing and sedentary activities (Azma, et al., 2015).

The three categories of data gathered—occurrence frequency, discomfort level, and work capability—will be amalgamated to generate comprehensive CMDQ scores (Salleh, et al., 2020). A higher CMDQ score indicates that a specific body area encounters pain more frequently, or in other words, it signifies an individual who often experiences heightened sensations of pain.

2.3. Rapid entire body assessment (REBA) and rapid upper body assessment (RULA)

Rapid Entire Body Assessment (REBA) is an ergonomic method used to evaluate the working posture of operators, encompassing the neck, back, arms, wrists, and legs (Valentine & Wisudawati, 2020). The outcomes obtained from the Rapid Entire Body Assessment (REBA) method include decision levels that indicate the urgency of required actions (Kurnia & Sobirin, 2020). REBA conducts an examination of ergonomic risk factors throughout the body in use, such as static and dynamic postures, speed of changes, unstable postures, ongoing lifting activities, and their frequency, workplace modifications, equipment, training, or worker behavior (Krisna Dewanti et al., 2020). The REBA method assesses both the working posture and the associated risk level. The risk level is determined by calculating the total score, which is derived from evaluating the image of the working posture (Thamrin et al., 2021b).

Meanwhile, the Rapid Upper Body Assessment (RULA), established in 1993 by McAtamney and Corlett, is designed to assess whether workers are exposed to risk factors for Musculoskeletal Disorders (MSD) in the upper extremities while performing their tasks (McAtamney, L. 1993). This method considers three primary factors: the posture of different body regions, the exerted load or force, and muscle activity, encompassing static postures or repetitive movements (Sherehiy et al., 2007). RULA categorizes the body regions it examines into two distinct groups, namely the lower arms and wrists (Group A), and the posture of the neck, trunk, and legs (Group B) (Namwongsa, et al., 2018).

In utilizing RULA and REBA, there are criteria for assessing the risk level. Each is evaluated based on the analyzed body parts. In RULA, the assessment is based on Group A (lower arms and wrists) and Group B (neck, trunk, and legs), which represent the upper body. Meanwhile, in REBA, the evaluation is based on the overall body used. The criteria for assessing the action level and risk level in RULA and REBA are visible in Table 1.

Based on Table 1, each action level is explained as follows:

1) Action Level 1: Low risk. Suggests an acceptable posture if not sustained or repeated for extended periods.
2) Action Level 2: Moderate risk. Indicates the need for further investigation and potential changes.
3) Action Level 3: High risk. The necessity for immediate investigation and changes.
4) Action Level 4: Very high risk. Requires immediate investigation and implementation of changes.

3. RESEARCH METHOD

This research employed a descriptive-analytic approach, coupled with the simulation software ErgoFellow 2.0. In general, there were six steps. The first one was observation. After observation, there were six workstations in the process of creating steamer pans. These were the cutting station, the steamer body manufacturing station, the filter production station, the handling station for a steamer, the pad installation station, and the packing station. There was 1 worker at 2 different workstations, and in total, 5 workers were analyzed for this study. At this stage, workers were also measured regarding the physical variations of the body, as shown in Table 1. The subsequent steps undertaken in this research involved collecting data, processing data, and analyzing

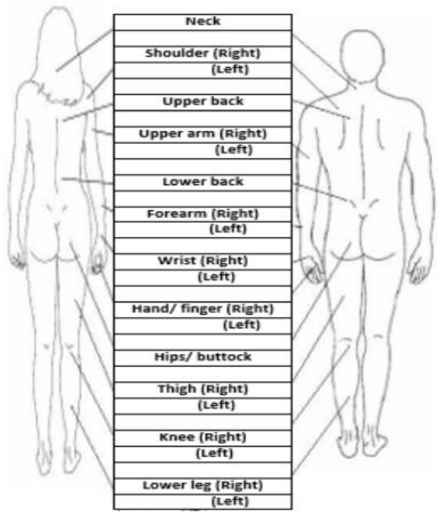

Figure 1. Cornell Musculoskeletal Discomfort Questionnaire, Male and Female

Table 1. Scores from RULA and REBA along with their corresponding action levels.

RULA Score	Action Level	REBA Score	Action Level	Risk Level
		1	0	Negligible
1-2	1	2-3	1	Low
3-4	2	4-7	2	Medium
5-6	3	8-10	3	High
7	4	11-15	4	Very High

Source: Cremasco et al (2019)

the results. In the end, it was concluded that there were several workstations that had a high level of WMSD risk.

After observation, some data was collected directly. The data retrieved relates to the data required in the use of RULA and REBA. Some of the data were taken, such as work posture in the form of photos obtained from the results of a screen capture video recording at each process, anthropometric measurements that are shown in Table 2, and CMDQ.

The table above was the result of observations made on existing workers. There were differences in the body size of workers, one of which was shoulder width. It seemed that there were no significant differences in terms of physical form among workers.

Workers were interviewed using the CMDQ. A self-report survey called CMDQ measures musculoskeletal pain and discomfort in people who work for lengthy periods of time. CMDQ is a subjective measurement tool questionnaire for body parts that are felt to experience pain at work (Pratama et al., 2019). From the results of the interview, it was found that at each workstation, the operator felt pain in different locations of their body due to the work. As shown in Tables 3 and 4.

Based on the anthropometric table above, it was found that most of the workers' bodies experienced pain. One example is body dimension number 6 (pain in the upper arm), number 7 (pain in the waist), or number 23 (pain in the right leg). The greater the CMDQ value, the higher the pain experienced by workers. It gives reasons for this research to further analyze the level of danger felt by the operator. From a total of 6 workstations, we identified the method that was suitable with the results of observations that had been screen captured from video records. One of the examples is shown in Figure 2.

Figure 2 was one of the examples of processes that were being carried out by workers. It could be seen that workers used a tool with a sitting posture using a chair. Judging from Figure 2, the assessment that will be used in analyzing the risk level in this process is RULA. RULA is used to analyze the level of danger in the upper body (Mufti, et al., 2013), and the process in the picture mainly uses the upper body to work. In order to determine which process uses RULA or REBA for the assessment, it is based on body posture when they are working. Another example of a workstation that uses REBA is shown in Figure 3.

Table 2. Workers Anthropometric Data

No	Workers	LB (cm)	TBD (cm)	LP (cm)	Ppo (cm)	Tpo (cm)	JP (cm)	JT (cm)	RT(cm)
1	1	42.4	93.1	39.0	45.0	44.7	82.6	85.4	174.3
2	2	41.7	90.5	41.1	44.2	43.5	76.9	80.4	169.5
3	3	44.0	88.8	38.5	45.5	45.0	80.0	77.9	167.0
4	4	42.5	89.9	40.0	43.6	44.0	81.7	81.5	172.2
5	5	41.0	91.0	42.8	42.5	43.1	79.3	84.6	173.7
Average		42.3	90.7	40.3	44.2	44.1	80.1	82.0	171.3
St. Dev		1.0	1.4	1.5	1.1	0.7	2.0	2.8	2.7

Shoulder width (LB), Shoulder height when sitting (TBD), Hip width (LP), Popliteal length (Ppo), Popliteal

Table 3. Cornell Musculoskeletal Discomfort Questionnaire Summary

No	Operator	Workstation	Age (Year)	CMDQ Body Dimensions														
				0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1	1	52	1	3	3	3	0	2	3	3	0	1	1	1	1	0	1
2	2	3	43	0	1	1	1	0	2	3	2	1	0	0	2	0	1	0
3	3	2, 4	46	1	1	0	2	0	3	1	2	0	3	1	1	0	1	0
4	4	6	48	1	0	1	1	1	1	3	2	0	0	0	1	1	0	1
5	5	5	22	0	1	1	2	1	2	3	1	1	1	1	2	0	1	1

Table 4. Cornell Musculoskeletal Discomfort Questionnaire Summary (cont'd)

No	Operator	Workstation	Age (Year)	CMDQ Body Dimensions												
				15	16	17	18	19	20	21	22	23	24	25	26	27
1	1	1	52	1	1	0	1	1	1	3	3	3	3	1	1	0
2	2	3	43	1	1	0	1	1	1	3	3	3	3	1	1	0
3	3	2, 4	46	1	0	0	1	1	2	2	1	0	1	0	0	1
4	4	6	48	0	1	0	0	3	3	3	1	0	0	1	0	3
5	5	5	22	0	0	1	1	1	2	2	2	0	0	0	1	0

Figure 2. Filter Production Process

Figure 3. Steamers Body Production Process

Table 5. The Use of RULA and REBA at Each Workstation

Number	Assessment	Workstations
1	Rapid Entire Body Assessment (REBA)	Workstation 4: Steamers Body Production Workstation 6: Packing Station
2	Rapid Upper Limb Assessment (RULA)	Workstation 1: Aluminium Cutting Workstation 2: Filter Production Workstation 3: Handle Production Workstation 5: Pad Assembly

Figure 3 was also an example of the process being carried out by workers. What distinguished it from Figure 2 was regarding the worker's body posture. In Figure 3, the workers did their work while standing.

Based on the above explanation, six workstations were analyzed using an assessment to calculate postural risk. The use of assessment in this study was based on the results of observations of workers at the station. Workers who used their whole body used the REBA, while workers who only used their upper body used RULA, which is shown in Table 5.

The next step was to identify the details of the postures that were used in RULA and REBA. The identification process was carried out in real-time when workers did work at their workstations, the results of which are shown in Tables 6 and 7.

In analyzing posture using the RULA, several parts of the body were the main assessment for determining the RULA score, namely the neck, trunk, legs, load, wrist, arm, coupling, and activity. There were several differences in the results of observations, the use of the legs at each workstation was different. There were workers who only used one of their legs as a fulcrum at workstation 5. Similarly, with the neck and trunk, some of the workers at the workstation are slightly bowed and slouched. Observation data at each workstation would produce a REBA value according to the worker's body posture.

In the REBA section, there were 2 workstations that used the REBA to analyze worker posture. From the observation results, it was found that at workstation 4, the workers' wrists, necks, trunks, and legs showed a discrepancy with ergonomic principles, which will be discussed in the next section.

Based on the data that had been obtained, data processing was carried out using the Ergofellow Application. Ergofellow was software that had supporting features for analyzing and evaluating work conditions to reduce injuries and increase productivity, such as RULA (Rapid Upper Limb Assessment), REBA (Rapid Entire Body Assessment), NIOSH, and others (Dewangan and Singh, 2015). The reason why this study used Ergofellow compared to manual calculations was because Ergofellow provided a more practical and objective measurement method. Manual calculations had the possibility of human error (miscalculation), while the Ergofellow application reduced this possibility.

The display shown by Ergofellow in the process of calculating RULA and REBA can be seen in Figures 4 and 5 below. Calculating RULA and REBA in Ergofellow, required some data related to the posture of workers while working. There were arms, trunks, wrists, legs, loads, muscles, etc. All this data was needed from every workstation that had been observed at UD National Ship. The data was input into Ergofellow by the analysis that had been carried out from the observations in Tables 6 and 7.

The results of the REBA and RULA calculation examples using Ergofellow at 2 workstations are shown in Figure 4. In the calculation process, some of the data described in the previous section was input. The two images (Figure 6 and 7) used as examples were images for calculating REBA calculations at the handle production workstation and RULA at the filter production workstation. After the calculation process was complete, the database feature in Ergofellow could store and provide the results of the calculation that had been entered.

From the results of the calculations that have been carried out, it is found that the REBA value at the packing station is 5, and the RULA value at the filter production workstation is 4. This indicated that the station has a risk of being exposed to WMSD, this will be discussed in the next section.

Table 6. Posture Analysis Using RULA

Number	Dimension	Workstation 1	Workstation 2	Workstation 3	Workstation 5
1	Neck	0 to 20 degrees	0 to 20 degrees	0 to 20 degrees	0 to 20 degrees
2	Trunk	20 to 60 degrees	0 to 60 degrees	20 to 60 degrees	20 to 60 degrees
3	Legs	Supported in one leg	Supported in two legs, seated	Supported in two legs, seated, more than 60 degrees	Supported in one leg, more than 60 degrees
4	Load	< 5 KG (< 11 lb)	< 5 KG (< 11 lb)	< 5 KG (< 11 lb)	< 5 KG (< 11 lb)
5	Wrist	Between 15 degrees up and down, bent from the midline	Between 15 degrees up and down, bent from the midline	Between 15 degrees up and down, bent from the midline	Between 15 degrees up and down, bent from the midline
6	Upper Arm	In extension more than 20 degrees and abducted	-20 degrees to 20 degrees and abducted	20 to 45 degrees	In extension more than 20 degrees and abducted
7	Lower Arm	0 to 60 degrees or more than 100 degrees	60 to 100 degrees	60 to 100 degrees	0 to 60 degrees or more than 100 degrees
8	Coupling	Fair	Poor	Fair	Fair
9	Activity	One or more body parts held longer than 1 min	Repeated small-range action (4x per min)	One or more body parts held longer than 1 min	One or more body parts held longer than 1 min

Table 7. Posture Analysis Using REBA

Number	Dimension	Workstation 6	Workstation 4
1	Upper Arm	45-90 degrees	45-90 degrees
2	Lower Arm	60 to 100 degrees	60 to 100 degrees, working across the midline of the body or out to the side
3	Wrist	-15 to +15 degrees	-15 to +15 degrees, bent away from the midline
4	Wrist Twist	Twisted away from handshake positions	Twisted away from handshake positions
5	Neck	10 to 20 degrees	0 to 10 degrees
6	Trunk	Straight	Bent
7	Legs	Well Supported and in an evenly balanced posture	Are not evenly balanced and supported (30 – 60 degrees)
8	Muscle Use (A)	Static, held longer than 1 minute or repeated more than 4 times per minute	Static, held longer than 1 minute or repeated more than 4 times per minute
9	Muscle Use (B)	Static, held longer than 1 minute or repeated more than 4 times per minute	Static, held longer than 1 minute or repeated more than 4 times per minute
10	Load (A)	No resistance, or less than 2 kg (4.4 lb) intermittent load	No resistance, or less than 2 kg (4.4 lb) intermittent load
11	Load (B)	No resistance, or less than 2 kg (4.4 lb) intermittent load	2 to 10 kg (4.4 to 22 lb) static load or repeated load

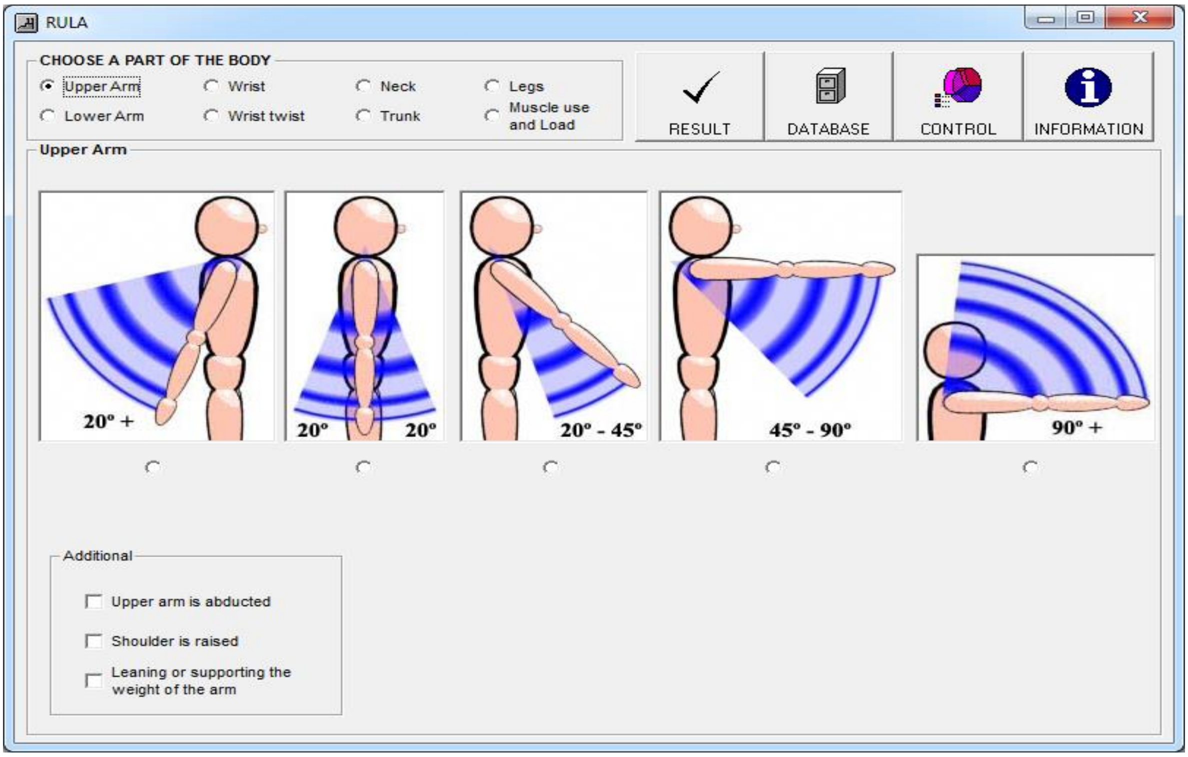

Figure 4. RULA in Ergofellow

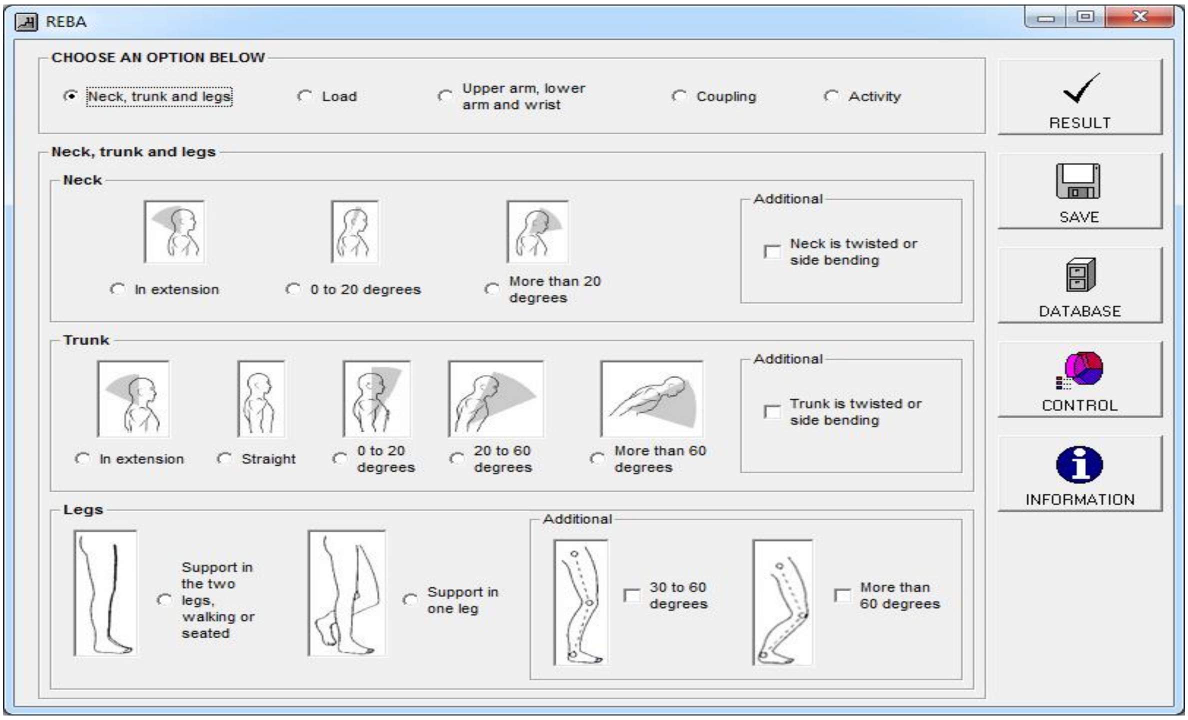

Figure 5. REBA in Ergofellow

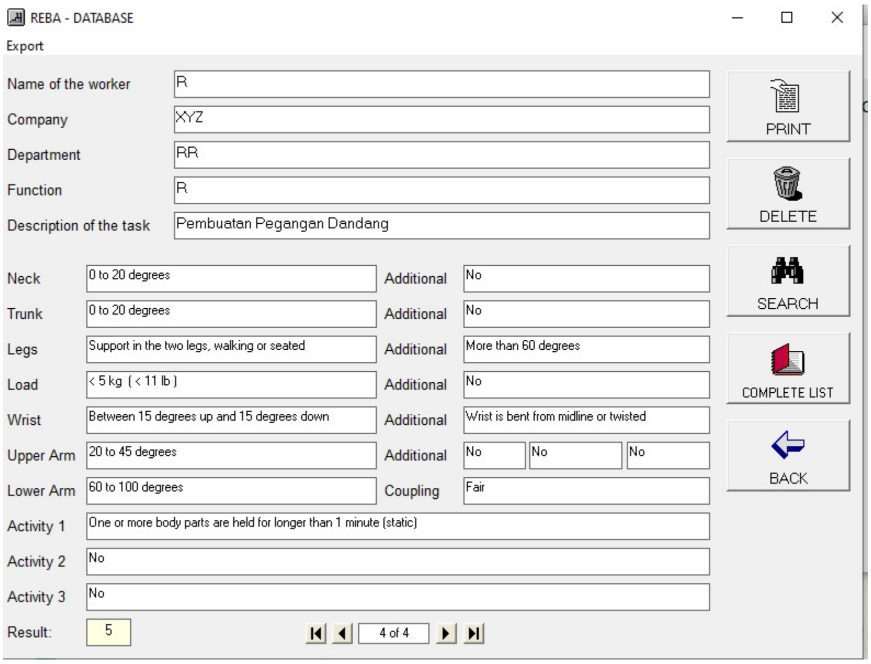

Figure 6. REBA Calculation in Ergofellow

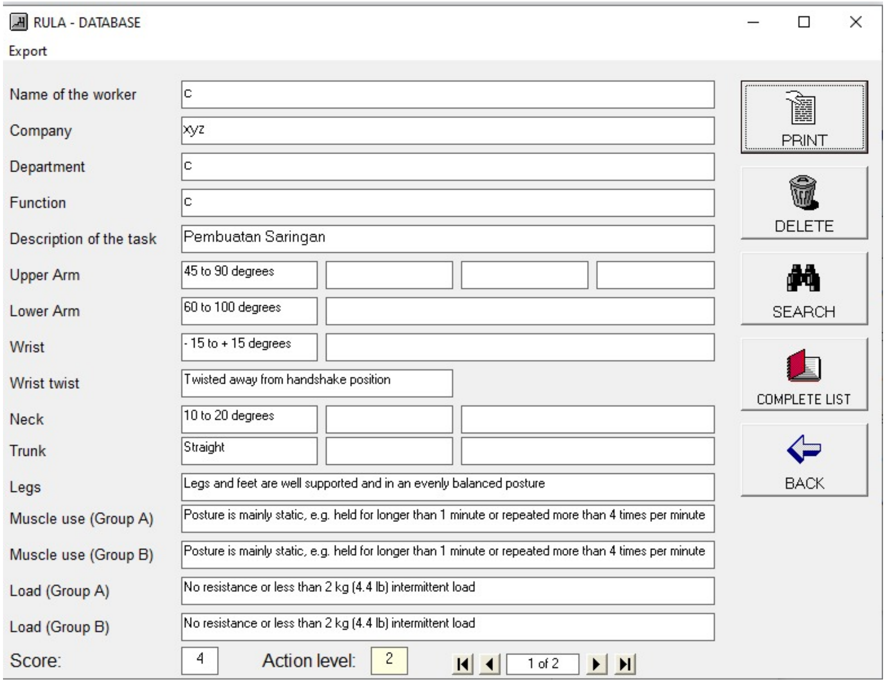

Figure 7. RULA Calculation in Ergofellow

4. RESULT AND DISCUSSION

Based on the data that has been obtained, data processing is carried out using Ergofellow Application. The calculation using the REBA method is used to analyze the posture data of the workers in stations 4 and 6. The resulting score is shown in Table 8, it can be seen that the REBA score at the filter production workstation is 7, and the REBA score at the packing workstation is 4.

Based on Table 8, station 4 which is working on the filter production process has a REBA Level of 7, this indicates that the work done by workers has a medium risk of experiencing WMSD. Based on the observations, there are several factors that can cause high REBA values. The position of the wrist that bends away and twists from the handshake position can be said to be abduction which creates a strain on the hand, they are shown in Figure 8. This is also supported by the CMDQ assessment results, where the worker experiences discomfort in the trunk (back) with the highest CMDQ score, indicating that the body posture adopted in this job poses a risk of developing work-related musculoskeletal disorders (WMSD).

This can cause symptoms if done repeatedly in the long term. Based on research conducted by Jensen (2003) in Sirajudeen (2018), there is an association between repeated hand use and hand symptoms. It can be concluded that redesign needs to be done on the arms and hands used for work in the filter production workstation.

Besides that, a neck that is too bent and a trunk that is too twisted can cause WMSD. If used too long, various injuries will appear, one of which will be experienced by workers is tension neck syndrome. This is due to stiffness in the neck muscles due to the neck muscles contracting continuously (hunching) (Mandagi, et al., 2022).

Workstation 6, namely the packing workstation, was found a relatively low risk. This does not yet have the urgency to take action, of course, periodic monitoring is needed to prevent WMSD from occurring.

The calculation using the RULA method is used to analyze the posture data of the workers in stations 1,2,3, and 5. The resulting score is shown in Table 9, it can be seen that the RULA score from Aluminium Cutting is 7, Steamers Body Production is 4, Handle Production is 8, and the last one is Pad Assembly is 5.

Based on Table 8, all workstations have a risk level that requires redesign. Especially workstation 1 and workstation 3. In workstations 1 and 3, the neck, trunk, and the activity itself are the biggest factors that can cause WMSD, as shown in Figures 9 and 10.

There are a number of things that cause high REBA values. The first one is the neck and trunk. A neck with 0-20 degrees is classified as bowed, it affects the trunk. If working for a long time this will cause neck syndrome, and the impact is headache, disability, neck, and shoulder pain. Several things can be done to avoid bending the neck for too long, by providing support in the form of ergonomic chairs and tables, especially in the aluminum cutting workstation, steamers body production workstation, and pad assembly workstation according to the worker's anthropometric data. This is in line with research conducted by Aljinovic et al (2022), which reduction of neck syndrome experienced by dentists is caused by improving work posture by using an ergonomic chair.

Another factor that needs to be solved is the wrist and arm. As we can see in Table 5, the wrist in all stations is bending. It will cause hand symptoms, that are already explained in the RULA section. The problem for the small manufacturing industry is they still use manual tools that are not designed to be used for long periods of time. One example is the aluminium cutting station which can be seen in Figure 10.

As we can see, the process of cutting aluminum still uses scissors. Scissors are not designed to cut aluminum with a working time span of 8 hours a day. To solve this problem, of course, they need working tools that are safer to use for a long period of time.

Apart from their working tools, we can also see how their position works. They squat and move on the ground with one leg supporting the body while bowing for 8 hours per day. Of course, this is what makes the assessment score identified as high risk. This can be solved if UD. National Ship provides facilities in the form of desk—benches, and work tools that are designed for long use.

Table 8. REBA Analysis Result

Number	Workstations	REBA Score	Risk Level
1	Workstation 4: Steamers Body Production	7	Medium Risk
2	Workstation 6: Packing Station	4	Low Risk

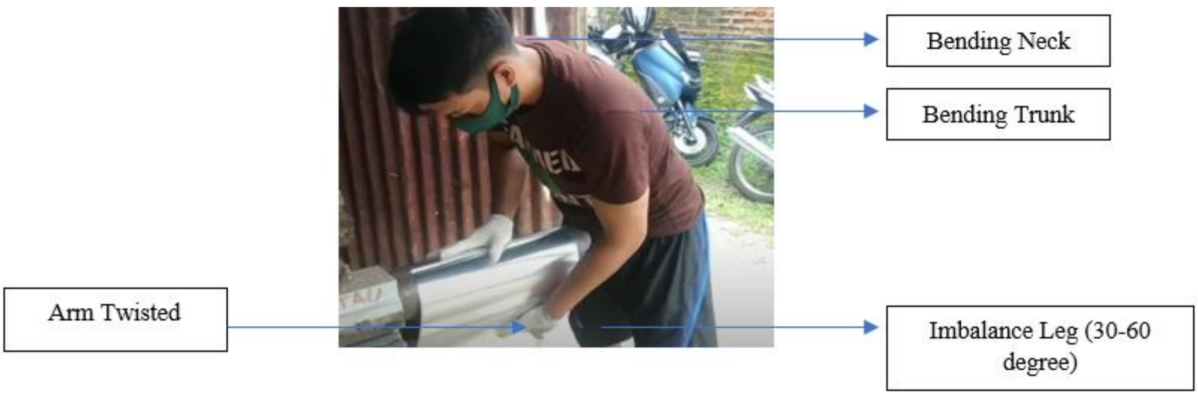

Figure 8. Steamers Body Production

Table 9. RULA Analysis Result

Number	Workstations	RULA Score	Action Level
1	Workstation 1: Aluminium Cutting	7	4
2	Workstation 2: Filter Production	4	2
3	Workstation 3: Handle Production	7	4
4	Workstation 5: Pad Assembly	5	3

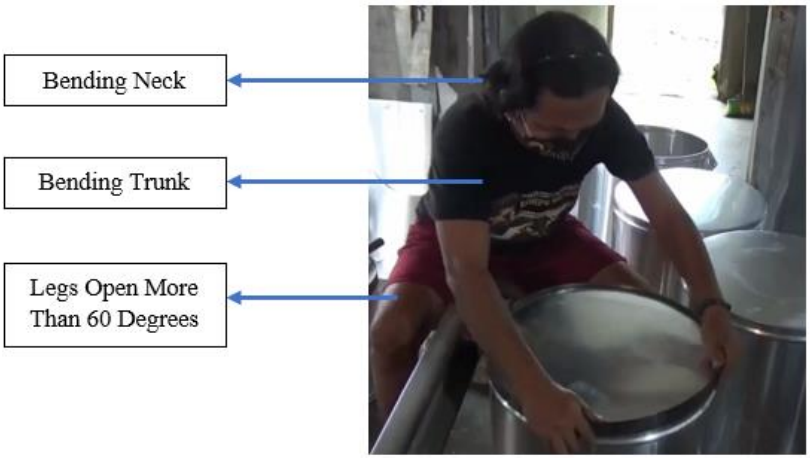

Figure 9. Handle Production Process

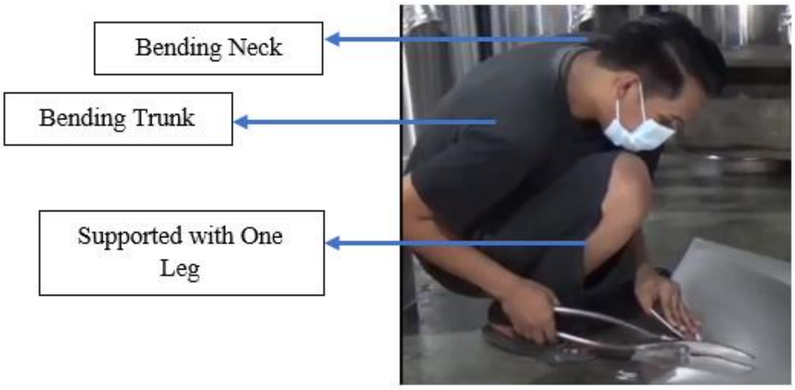

Figure 10. Aluminium Cutting Process

5. CONCLUSIONS

Work-related Musculoskeletal Disorders (WMSD) are a problem that is often experienced by workers in various sectors. Many impacts can occur if WMSD is experienced by workers, one of them is injuries that have an impact on worker productivity. Workers affected by WMSD will not work optimally, which will have an impact on business revenue and stability. Of course, this problem needs to be avoided, there are ways to avoid problems related to WMSD, and one of them is doing work with ergonomics.

In this study conducted at UD. National Ship, we found several workstations that are not ergonomic. This has the risk of causing WMSD to the workers. The results of the analysis using RULA found that one of the stations has a high level of risk. At the same time, the analysis from REBA found 2 stations with high risk and 2 others with moderate risk. The recommendation that can be given is to provide ergonomic chairs and tables to work at these stations, besides that, a semi-automated machine is also needed which is designed to work for long periods.

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