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Design Of Work Aid Tools To Improve Man Power Work Posture Using Rula Method (Rapid Upper Limb Assessment) PT. XYZ

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ABSTRACT

This research was conducted in the ACG-S Department with the object of observation of Man Power in the Wire Connection Soldering Stator Line 4B Process. With the aim of obtaining the value of Man Power's work posture and providing recommendations for improving work posture in the Wire Connection Soldering Process. To find out the data, the researcher used the Nordic Body Map (NBM) Questionnaire to find out subjective complaints from Man Power, then a work posture assessment was carried out using the Rapid Upper Limb Assessment (RULA) Method. The results of the Nordic Body Map (NBM) Questionnaire showed that 4 out of 6 Man Power complained of pain in the neck, back, shoulders, and waist areas, then from the results of the work posture assessment using the RULA method, a final score of 6 was obtained, which means that the Man Power's work posture position is at a high level (High) meaning that there is a high risk of Man Power getting Musculoskeletal Disorders (MSDs) and requiring posture improvement. Improvement of work posture is carried out by adding work aids, namely magnifying glasses and Poka Yoke Camera Soldering. After improving posture by adding work aids, the results of the work posture assessment using the RULA method obtained a final score of 3, which means that the Man Power work posture position after adding work aids is at a moderate level, which means that there is a moderate risk of Man Power getting Musculoskeletal Disorders (MSDs) and does not require action to improve body posture.

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1. Introduction

The manufacturing industry processes raw materials into final products using machines, labor, and structured production processes. There are several types of manufacturing industries, one of which is the Automotive Industry. The Automotive Industry is engaged in the design, development, production, marketing, sales, repair, and modification of motor vehicles. One example of the Automotive Industry is PT.XYZ.

PT.XYZ consists of three plants located in Sunter and Bekasi. The third plant consists of 13 production departments and the ACG-S Department is one of the departments at PT.XYZ Plant three Of the three Plants, PT.XYZ has a maximum Customer Claim limit of ten items in one year, meaning that each plant is given a maximum Customer Claim limit of three items, but there have been two Customer Claim items in one of the ACG-S production processes, namely the Wire Connection Soldering process. According to Table 1, the number of customer claims that occurred in the period January – December 2023 was:

Table 1. Warranty Claim Customer Data

No.	*Claim Clasification*	Model	*Problem*	*Received*	*Repair Date*	*Production Date*
1.	*Warranty Claim*	K2F	*No Solder at Phase V (T2)*	*26 July 2023*	*26 June 2023*	*18 January 2023*
2.	*Warranty Claim*	K2F	*No Solder at Phase V (T2)*	*10 August 2023*	*10 September 2023*	*10 April 2023*

Looking at the table 1, ACG-S Department has made claims as much as 2/3 of Customer Claims or 66.67% of the maximum limit that has been determined. The two Customer Claims are in the form of Terminal B not being soldered with Wire Assy and there has been a Jumping Process due to operator negligence (Human Error), This makes Emergency Quality and becomes a full concentration for repairs because it has exceeded the maximum limit of customer claims that have been determined. Observation and interview process was conducted on Man Power of Wire Connection Soldering process related to work flow, work posture, and potential hazards that resulted in Jumping Process due to operator negligence (Human Error) and resulted in Customer Claim twice with the same case, the main problem conveyed by man power of Wire Connection Soldering process was the unsafe working posture due to Man Power's view distance to Terminal B which will be soldered too far and causing muscle tension and excessive static loading on the neck and shoulder area during the work process, this greatly affects the performance of Man Power of Wire Connection Soldering process because with excessive static loading during the work process it causes fatigue experienced by man power and has an impact on decreasing performance and quality of the products produced.

The results of the analysis were obtained after conducting research and direct observation on the production line by providing Nordic Body Map (NBM) Questionnaire to Man Power of Wire Connection Soldering process to find out subjective complaints felt(Bilal, 2022) and using RULA (Rapid Upper Limb Assessment) method to find out the value of body posture before repairs were made.

In an effort to improve the work posture of Man Power in the Wire Connection Soldering process with the aim of reducing the risk of Musculoskeletal Disorders (MSDs) and creating a safe and comfortable workplace to increase work effectiveness and the quality of the products produced, improvements were made with the proposal to add a work aid, namely a magnifying glass. It is hoped that by adding this magnifying glass work aid, it can change the Man Power's viewing distance to be closer to the terminal and Wire Assy to be soldered. Then for the Safety System, improvements were made with the proposal to add a Poka Yoke Camera Soldering. The purpose of the proposed Poka Yoke Camera Soldering tool in the Wire Connection Soldering Process is to prevent negligence of terminal B not being soldered or Claim No Soldering due to human error, this Poka Yoke Camera

Soldering is based on the principle of being a decision maker (Adjustment) regarding the quality of the soldering results on terminal B. If the soldering results do not match the Master Check Soldering, the Stopper Pallet on the Conveyer cannot go down and the Pallet Jig cannot be shifted. With these two improvements, it is hoped that it will be able to create a safe, comfortable work area, and can reduce the risk level of Man Power in the Wire Connection Soldering process being affected by Musculoskeletal Disorders (MSDs), and prevent the recurrence of Customer Claims in the Wire Connection Soldering Process.

2. Literature Review

Ergonomics

Ergo means work and Nomos means natural law, Ergonomics is an interdisciplinary science that involves several sciences including anatomy, physiology, psychology, biomechanics, design, and management(Ramdhani & Zalynda, 2018). Ergonomics is an effort in the form of science, technology, and art to harmonize equipment, work machines, systems, organizations and the environment with human capabilities, abilities and limitations so that a healthy, safe, comfortable, efficient and optimal condition and environment is achieved(Wijaya & Muhsin, 2018).

Nordic Body Map (NBM)

Nordic Body Map is a questionnaire in the form of a body map used to collect data on body parts complained about by workers(Mahawati et al., 2021). This questionnaire is one of the most common tools used to assess the level of discomfort or physical symptoms in workers in the work environment(Ridwan Malik et al., 2021). The data from the Nordic Body Map questionnaire will be processed to calculate the percentage of respondents who reported pain in certain body parts. This information can be used to identify the body parts that respondents most often feel pain in while doing their jobs. Thus, this data can be used to assess the ergonomic level of a work process(Ridwan Malik et al., 2021).

Rapid Upper Limb Assessment (RULA)

Rapid Upper Limb Assessment (RULA) is a method developed in the field of ergonomics that investigates and assesses the working position carried out by the upper body(Ahmad et al., 2020). This method does not require special devices in providing an assessment of the posture of the neck, back, and upper body. In line with the function of the muscles and external loads supported by the body, the ergonomic technology evaluates the posture, strength and muscle activity that causes injuries due to repetitive activities(E, 2018). The Information Technology evaluates the posture or attitude, strength or muscle activity that causes injuries due to activities (repetitive strain injuries)(Tiara Catur Anggraini et al., 2022). Ergonomics is applied to evaluate the results of the approach in the form of a risk score between one and seven, where the highest score indicates a level that results in a high risk to be carried out at work. This does not mean that the lowest score will guarantee that the work being studied is free from ergonomic hazards(Pramana et al., 2021).

3. Methodology

In this study, reviewed from the approach, it is included in the type of Descriptive research with a Quantitative approach. This type of research is used to describe conditions that are or have occurred(Djollong, 2014), and then analyze them using the RULA (Rapid Upper Limb Assessment) method. The object of research in this study is the working posture of Man Power in the Wire connection Soldering process. While the subject in this study is Man Power in the Wire connection Soldering stator line 4 process. The researcher chose this object because the working posture of Man

Power in the Wire connection Soldering process has a high risk of man power being affected by Musculoskeletal Disorders (MSDs).

The research stages with the object of Man Power Wire Connection Soldering Process can be seen in Figure 1:

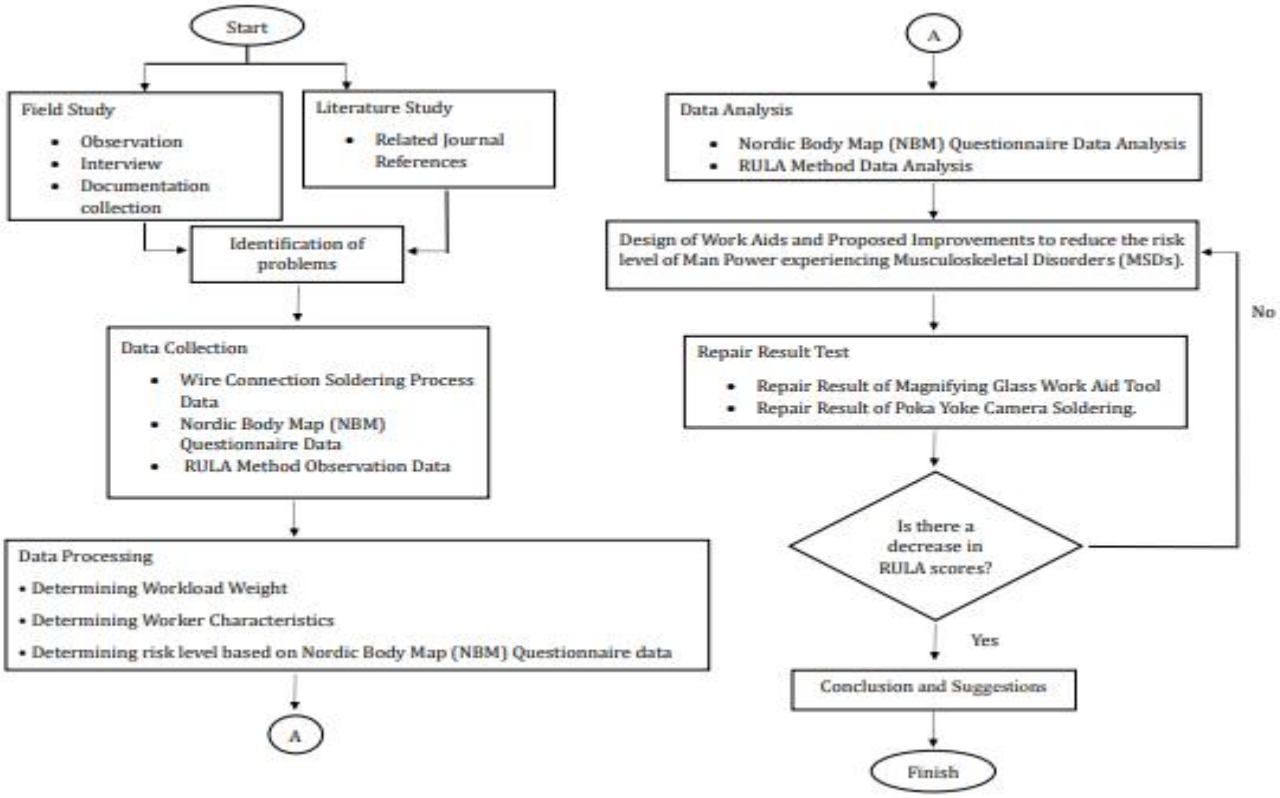


Figure 1. Research Flow Diagram

4. Results and Discussion

ACG-S Department Profile

ACG-S Department is one of the departments in PT.XYZ, ACG-S Department carries out its production activities for 8 hours and produces Stator and Rotor (FlyWheel) products for PT. Astra Honda Motor and PT. Yamaha Indonesia Motor Manufacturing. ACG-S Department itself consists of 8 Production Lines, with the status of 7 Active Production Lines and 1 Inactive Production Line.

Wire Connection Soldering Process

In this study, taking a literature study on Stator Line 4, there is one process called Wire Connection Soldering, which is the process of uniting Wire Assy with terminal B using Ace Solder media (tin) as the coating media. The sequence of work steps in the Wire Connection Soldering Process can be seen from the flow diagram in Figure 2:

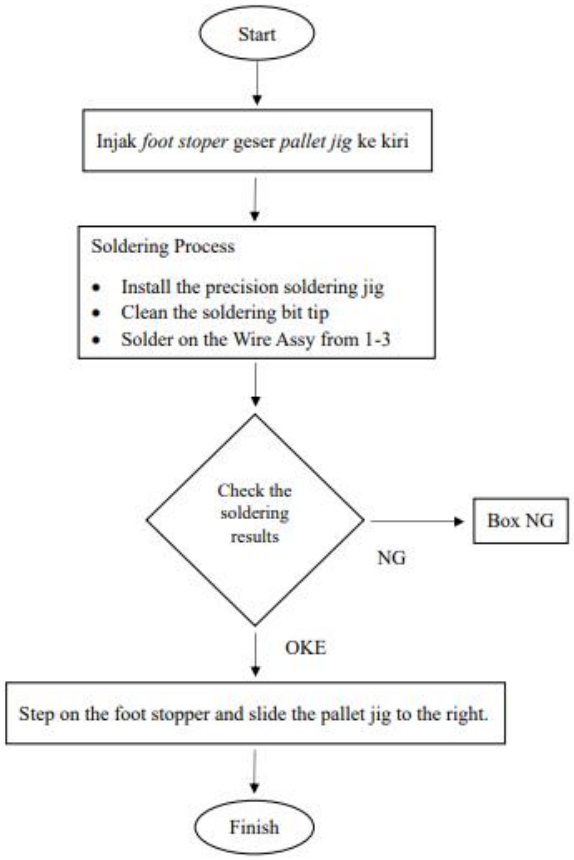


Figure 2. Flowchart of Wire Connection Soldering Process

Workload

The ergonomic aspect problem in the Wire Connection Soldering process is that man power must do work repeatedly by maintaining a poor working posture and receiving excessive static loads. After observation and interview process with man power of the Wire Connection Soldering process, they complained of pain in the neck and back because the working position was too bent over, this was caused by the working position and the distance of the man power's view from his work desk being too far. This kind of working posture position can be a potential Musculoskeletal Disorders (MSDs)(BENI SPRIANTO ZAI, 2023) and will have an impact on the decrease in production effectiveness and the quality of the goods produced if the work method and work desk of the Wire Connection Soldering Stator Line 4 process are not immediately improved.

As reference data for complaints of pain experienced by Man Power of the Wire Connection Soldering Process, a Questionnaire was created by referring to the Nordic Body Map (NBM) method. This questionnaire was given to all Man Power of the Wire Connection Soldering Stator Line 3 and 4 Processes, with the results of the Nordic Body Map (NBM) Questionnaire on Man Power in the Wire Connection Soldering Process, it shows that:

a. Neck pain is felt by 4 out of 6 Man Power in the Wire Connection Soldering Process with a complaint location score of 17, this is because the Man Power's line of sight with Terminal B to be soldered is too far, resulting in excessive static loading on the neck area.
b. Shoulder pain is felt by 4 out of 6 Man Power in the Wire Connection Soldering Process with a complaint location score of 15, this is caused by the position of the Shoulder receiving excessive static loading from the Neck and Back causing Shoulder pain.

c. Back pain is felt by 4 out of 6 Man Power in the Wire Connection Soldering Process with a complaint location score of 18, this is caused by excessive static loading on the neck and a working posture that is too bent over causing back pain.
d. Waist pain is felt by 3 out of 6 Man Power in the Wire Connection Soldering Process with a complaint location score of 15, this is caused by the Waist supporting an unhealthy working posture position, resulting in an unbalanced distribution of body weight and causing pain in the waist area.

Analysis of Man Power Work Posture in Wire Connection Soldering Stator Assy Line 4 Process Using Rapid Upper Limb Assessment (RULA) Method

Rapid Upper Limb Assessment (RULA) data processing was obtained from direct observation of Man Power in Wire Connection Soldering Stator Line 4 Process, which was then used to calculate the angle formed from the working position during the Wire Connection Soldering process.

The first stage is to assess the body posture of the work station, and analyze the angle formed by Man Power in Wire Connection Soldering Stator Line 4 Process during the Wire Connection Soldering process. The following is the body posture and angle assessment formed by Man Power in Wire Connection Soldering Stator Line 4 Process, which can be seen in Figure 3:

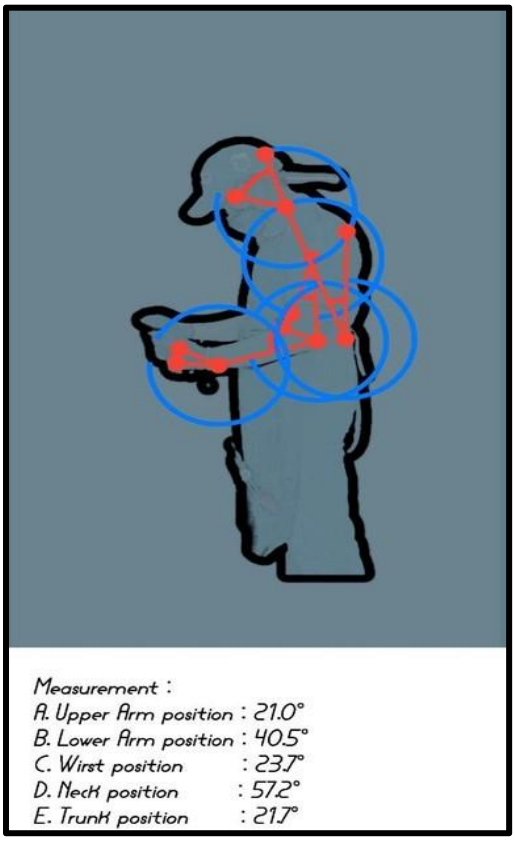


Figure 3. Working Posture Before Repair

Then, a work posture assessment was carried out using the Rapid Upper Limb Assessment (RULA) method analysis sheet, which can be seen in Figure 4:

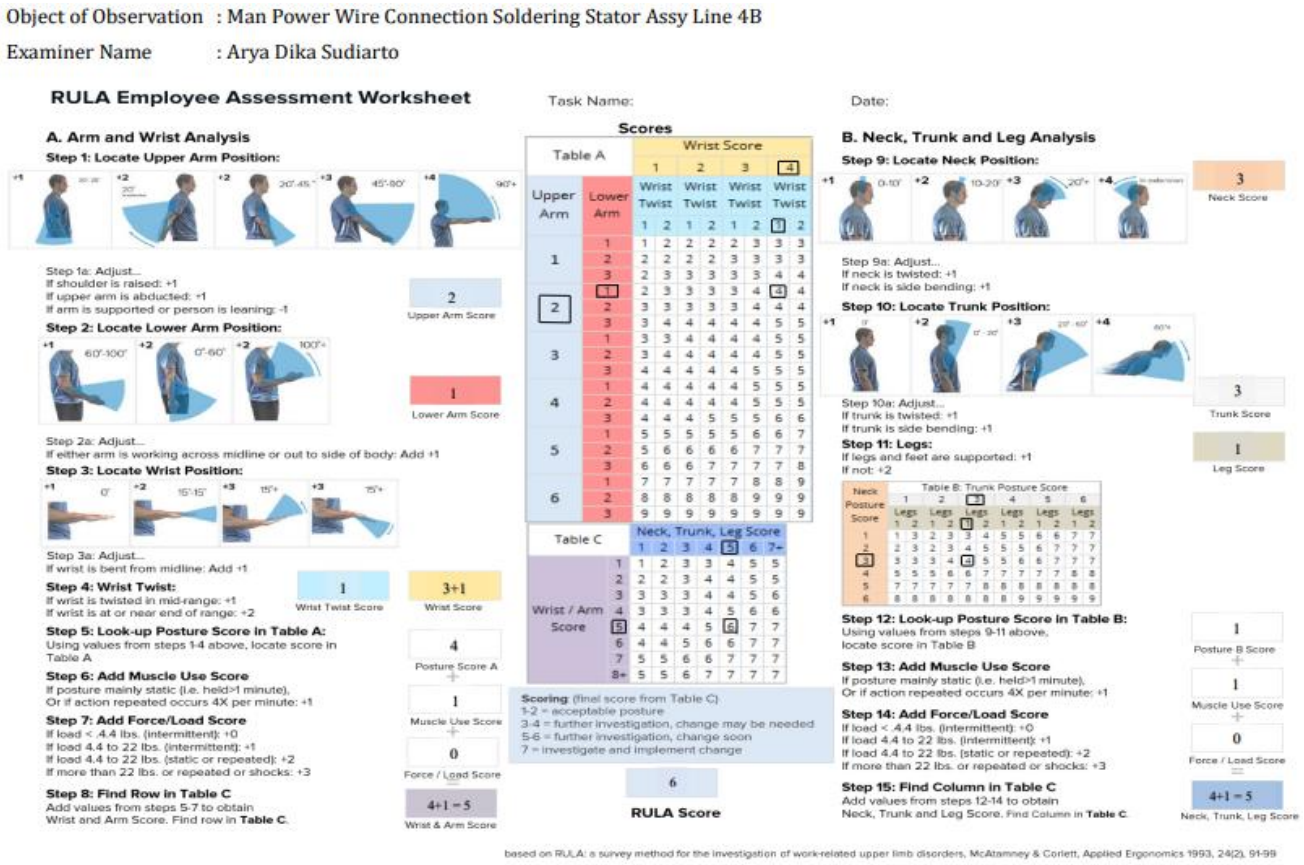


Figure 4. RULA Assessment Sheet Before Repair

Looking at the observations and data processing that have been carried out, the following research results were obtained:

1. Wirst / Arm Score: 5
2. Neck, Trunk, and Leg Score: 5

Then the Score Table C is 6, which means that the position of the Wire Connection Soldering manpower work posture is at a high level (High) meaning that there is a high risk of manpower being affected by Musculoskeletal Disorders (MSDs) and requires corrective action on the body posture position.

Improvement Proposal with Additional Tools

Addition of Magnifying Glass Work Tools

Based on the results of the Analysis using the Rapid Upper Limb Assessment (RULA) method, it is known that the Man Power's working position in the Wire Connection Soldering Stator Line 4B Process is not safe because it receives excessive static loads during work and has a high potential for Musculoskeletal Disorders (MSDs) which will have an impact on the effectiveness and quality of the products produced, therefore a proposal for improvement was made by adding a tool, namely a magnifying glass on the Wire Connection Soldering Process workbench, the addition of this magnifying glass tool changes the Man Power's view to be closer to the terminal and Wire Assy to be soldered, it is hoped that this improvement can change the position of the neck posture in the range of 0˚-20˚, change the position of the back posture in the range of 0˚-20˚, so that the risk level decreases to low(Yuamita & Sary, 2017).

The following is the design of the workbench in the Wire Connection Soldering Process before the addition of the magnifying glass can be seen in Figure 5:

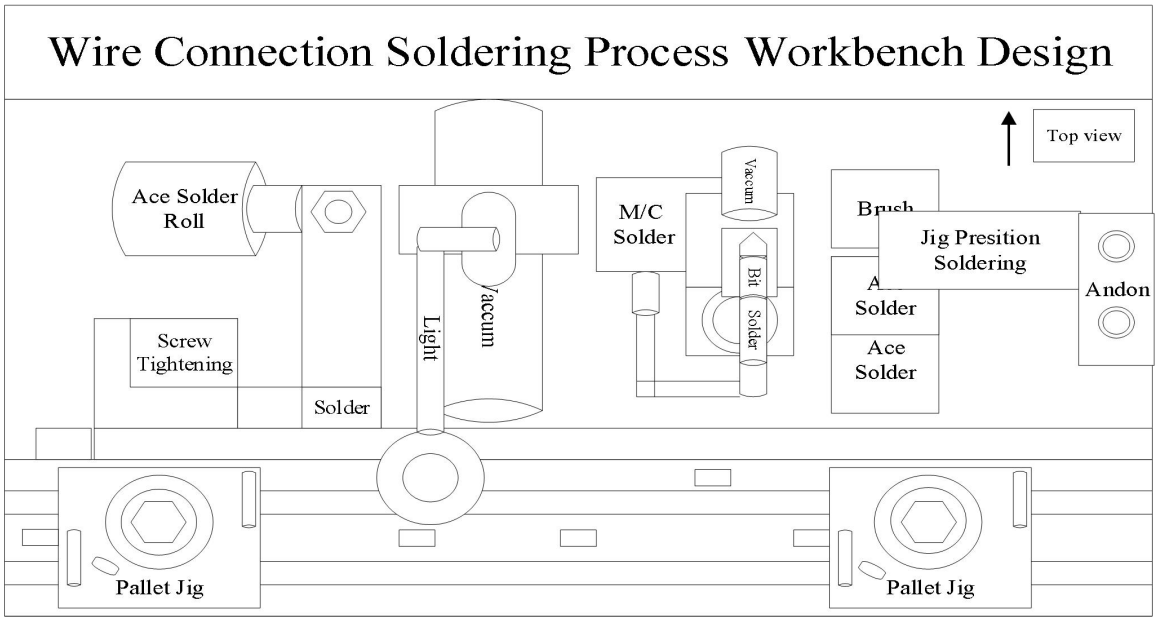


Figure 5. Workbench Design Before Repair

Then here is the design of the work table in the Wire Connection Soldering Process after improvements were made by adding a magnifying glass to the work table lamp. The Wire Connection Soldering Process can be seen in Figure 6:

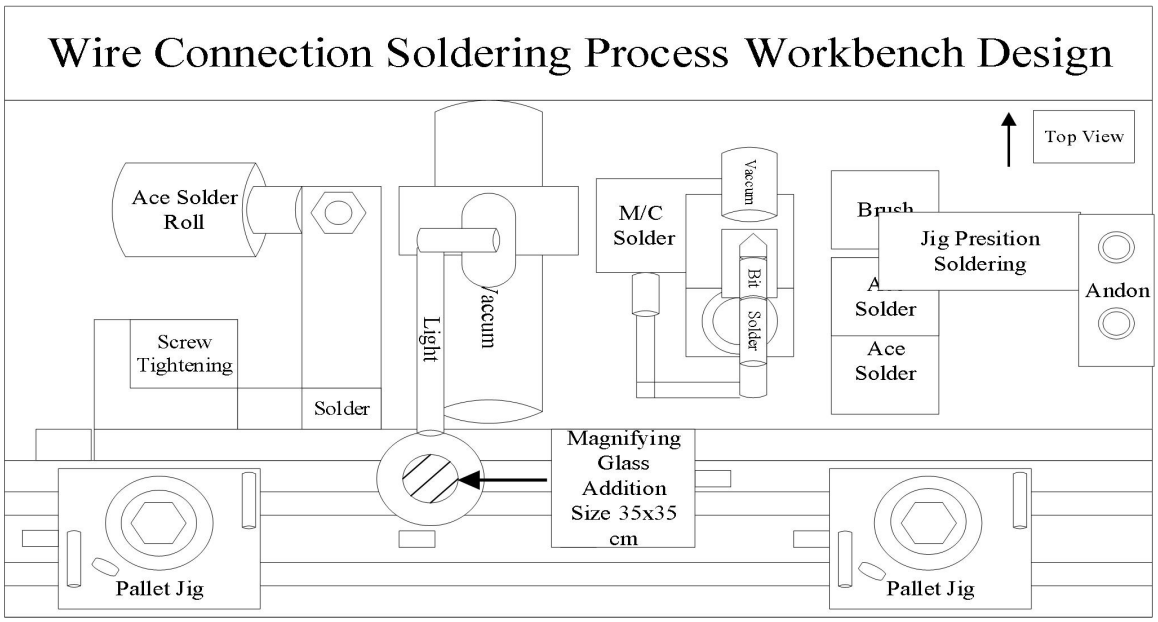


Figure 6. Workbench Design After Repair

Addition of Poka Yoke Camera Soldering Work Aids

The researcher proposed a tool in the form of Poka Yoke Camera Soldering in the Wire Connection Soldering Stator Line 4B Process, Poka Yoke itself is a tool designed to minimize negligence or errors due to human error. The purpose of the proposed tool in the form of Poka Yoke Camera Soldering in the Wire Connection Soldering Process is to prevent negligence of terminal B not being soldered or Claim No Soldering due to human error, Poka Yoke Camera Soldering is based on the principle of making decisions (Adjustment) regarding the quality of the soldering results on

terminal B, If the soldering results do not match the Master Check Soldering, the Stopper Pallet on the Conveyer cannot go down and the Pallet Jig cannot be shifted.

The tools used in Poka Yoke Camera Soldering are:

a. Photoelectric Sensor
b. Camera Logi Brio 500
c. PLC MC Camera Soldering
d. Camera Soldering Operation Panel
e. HP Compq LE1711 Monitor

Before starting the production process, Man Power must first perform a Master Check so that the Poka Yoke Camera Soldering in the Wire Connection Soldering Process is active and can provide (Adjustment) related to the quality of the soldering results on terminal B. The Master Check process flow for Poka Yoke Camera Soldering in the Wire Connection Soldering Process can be seen in the Figure 7:

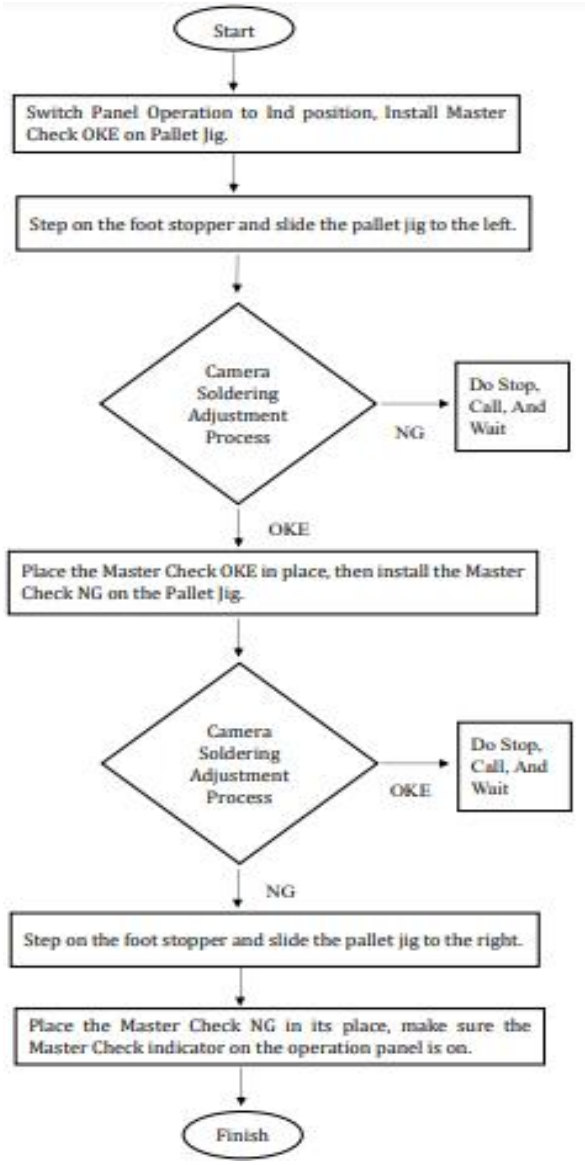


Figure 7. Master Check Poka Yoke Camera Soldering Flow Diagram

Results After Improvement

Results of Improvement of Magnifying Glass Work Aid Using Nordic Body Map (NBM) Questionnaire Results

The researcher made improvements by adding a magnifying glass work aid to the Wire Connection Soldering process,to determine the effectiveness of the improvement, the Nordic Body Map (NBM) Questionnaire was given to Man Power in the Wire Connection Soldering Process as a reference for data on complaints of pain experienced after the improvement.

Based on the results of the Nordic Body Map (NBM) Questionnaire on Man Power in the Wire Connection Soldering Process, it shows that:

a. Neck pain is felt by 4 out of 6 Man Power in the Wire Connection Soldering Process with a total score of complaint locations of 17 after repairs have decreased to 6.
b. Shoulder pain is felt by 4 out of 6 Man Power in the Wire Connection Soldering Process with a total score of complaint locations of 15 after repairs have decreased to 10.
c. Back pain is felt by 4 out of 6 Man Power in the Wire Connection Soldering Process with a total score of complaint locations of 18 after repairs have decreased to 7.
d. Waist pain is felt by 3 out of 6 Man Power in the Wire Connection Soldering Process with a total score of complaint locations of 15 after repairs have decreased to 7.

Results of Repairing Magnifying Glass Work Aids Using the Rapid Upper Limb Assessment (RULA) Method.

The work posture formed after repairs can be seen in Figure 8:

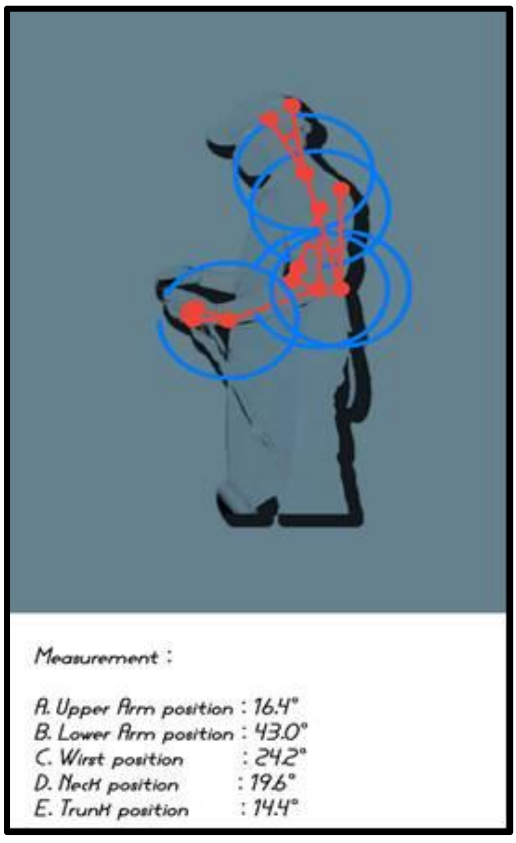


Figure 8. Work Posture After Repair

Then, a work posture assessment was carried out using the Rapid Upper Limb Assessment (RULA) method analysis sheet, which can be seen in Figure 9:

Figure 9. RULA Assessment Sheet After Improvement

Based on the observations and data processing that have been carried out, the following research results were obtained:

1. Wirst / Arm Score: 4
2. Neck, Trunk, and Leg Score: 3

Then Score Table C is 3, which means that the position of the Wire Connection Soldering manpower work posture after the addition of a magnifying glass tool is at a moderate level (Moderate) meaning that it has a moderate risk of manpower being affected by Musculoskeletal Disorders (MSDs) and does not require corrective action on the body posture position.

Poka Yoke Camera Soldering Improvement Results

The purpose of the proposed Poka Yoke Camera Soldering tool in the Wire Connection Soldering Process is to prevent negligence of terminal B not being soldered or Claim No Soldering due to human error, this Poka Yoke Camera Soldering is based on the principle of making decisions (Adjustment) regarding the quality of the soldering results on terminal B, If the soldering results do not match the Master Check Soldering, the Stopper Pallet on the Conveyer cannot go down and the Pallet Jig cannot be shifted. The way Poka Yoke Camera Soldering works in the Wire Connection Soldering Process is:

a. The Photoelectric Sensor will read the position of the Stator Assy on the Pallet Jig,
b. Then, after reading OK, the Camera Logi Brio 500 will take a picture,
c. After that, the Camera Logi Brio 500 will analyze the soldering results by matching them to the NG Condition Soldering sample limit,
d. If the result is OK, the Stopper on the Conveyer will automatically go down and can continue to the Next Process,
e. While if the result is NG, then Man Power must work one cycle, and do SCW by turning on the andon and waiting for the PIC Line to come,

f. After that, the NG Part is put into the NG Box, Give the NG type identity tag, and push the NG Box until it passes the NG Photoelectric Sensor Sutter,
g. Confirm to the PIC Line that the handling of the NG part has been carried out, and the PIC Line conducts research on the Camera Soldering Operation Panel so that the Stopper on the Conveyer can go down and can continue to the Next Process.

Then, the sample limit of the soldering results can be seen in Table 2:

Table 2. Soldering Sample Limit

No.	OKE Condition	NG Condition
1.	Solder Not Less	Wire Not Soldered
2.	Solder Not Cracked/Porous	Wire Melted
3.	Solder Not Over/Overflow	Solder Ball on Armature
4.	Solder Not Horn	Solder Less
5.	Wire Not Melted	Solder Over/Overflow
6.	Bobbin Not Melted	Solder Cracked/Porous
7.	No Solder Ball on Armature	Solder Horn
8.	No Solder Flux on Core	Solder Flux on Core
9.	All Three Wires Soldered	Bobbin Melted

The following Shutter NG design in the Wire Connection Soldering Process can be seen in Figure 9:

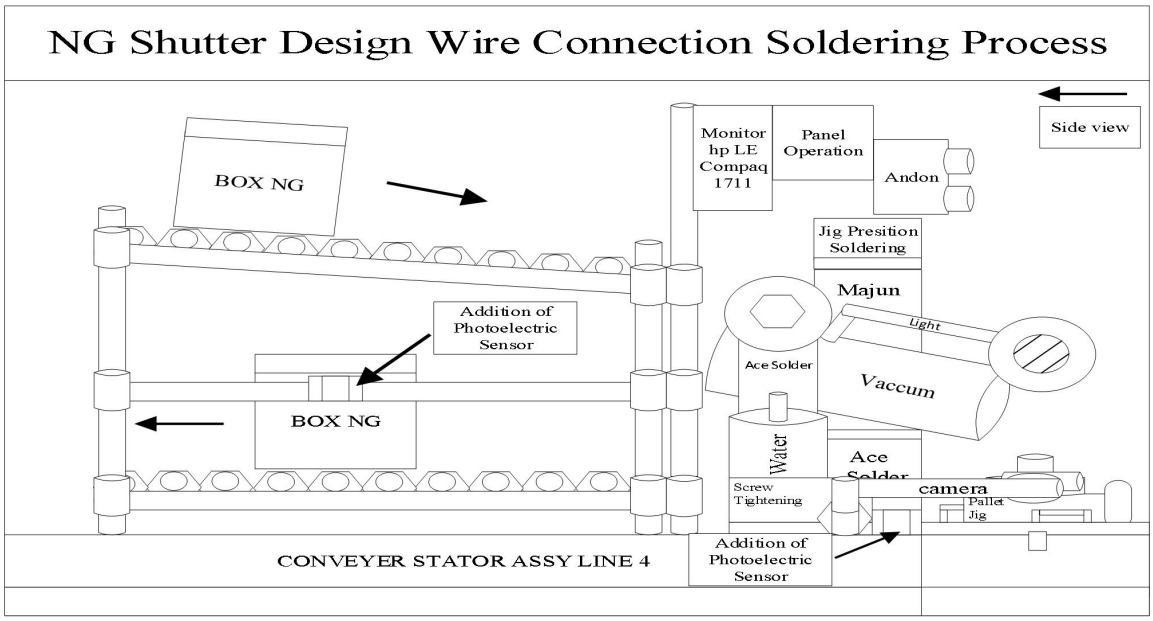


Figure 9. Shutter NG Design in Wire Connection Soldering Process

The working method in handling NG Part in the Wire Connection Soldering Process is:

a. If the Soldering result reads NG on the Poka Yoke Camera Soldering system, then Man Power must work one cycle, and perform SCW by turning on the andon and waiting for the PIC Line to arrive,
b. After that, the NG Part is inserted into the NG Box, Give the NG type identity tag, and push the NG Box until it passes the NG Photoelectric Sensor Sutter,
c. Confirm to the PIC Line that the handling of the NG part has been carried out, and the PIC Line conducts research on the Camera Soldering Operation Panel so that the Stopper on the Conveyer can go down and can continue to the Next Process.

The following is the design of the work table in the Wire Connection Soldering Process before the Improvement was carried out with the addition of Poka Yoke Camera Soldering, which can be seen in Figure 10:

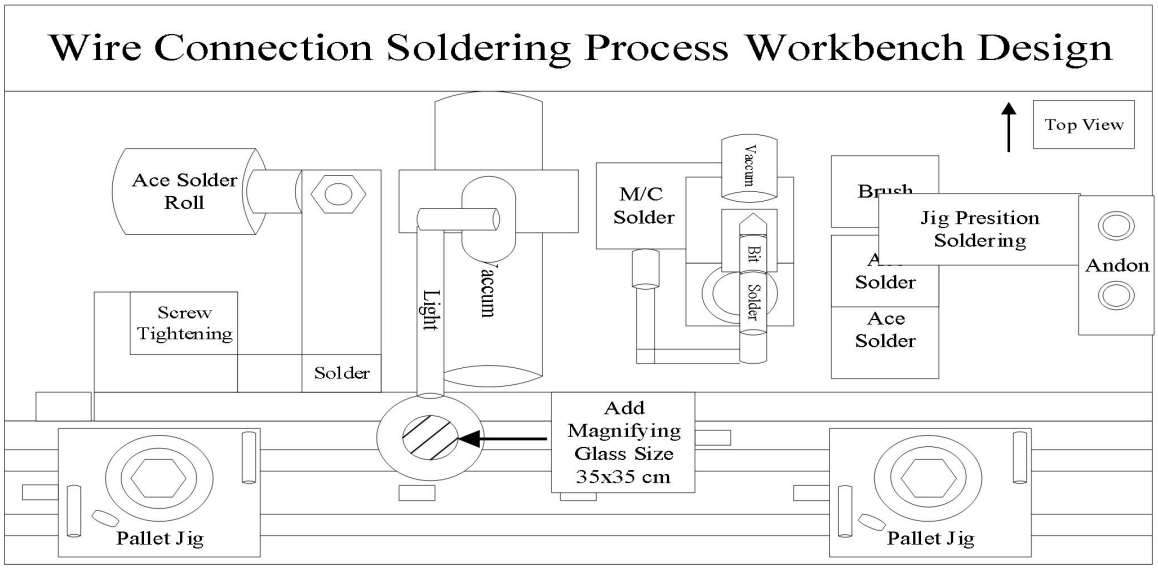


Figure 10. Workbench Design Before Adding Poka Yoke Camera Soldering

The following is the design of the work table in the Wire Connection Soldering Process after improvements were made with the addition of Poka Yoke Camera Soldering, which can be seen in Figure 10:

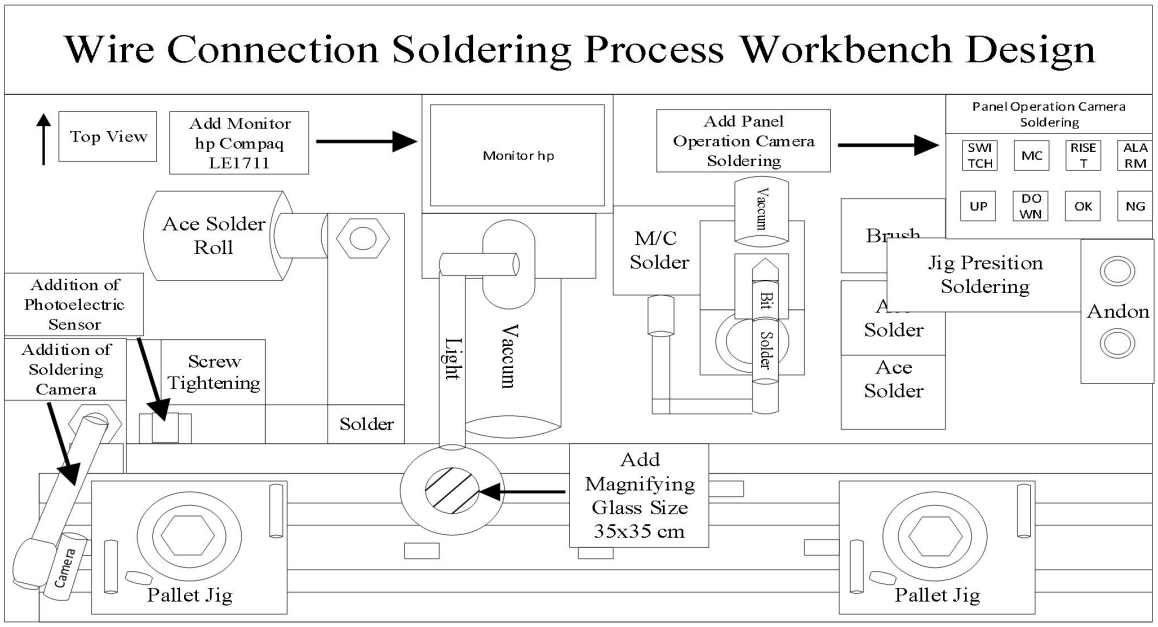


Figure 11. Workbench Design After Adding Poka Yoke Camera Soldering

Comparison after Improvement

Comparison of Nordic Body Map (NBM) Questionnaire Results

Comparison of the Nordic Body Map (NBM) questionnaire results given to all Man Power of the Wire Connection Soldering Stator Line 3 and 4 Process after improvements were made with the addition of work aids in the form of magnifying glasses focused on the body parts complained about by the Man Power, including pain in the Neck, Back, Shoulders, and Waist, the following comparison of the complaint location scores can be seen in Table 3:

Table 3. Complaint Location Score Comparison After Repair

No.	Complaint Location	Complaint Location Score Before Repair	Complaint Location Score After Repair	Percentage of Complaint Location Score Decrease
1.	Upper Neck	17	6	45,83%
2.	Lower Neck	17	6	45,83%
3.	Left Shoulder	15	10	20,83%
4.	Right Shoulder	15	10	20,83%
5.	Back	18	7	45,83%
6.	Waist	15	7	29,63%

Example of calculating of the percentage of decline that occurs in the body parts of the Neck, Shoulder, Back, and Waist is carried out based on the score of the location of the complaint from the results of the Nordic Body Map (NBM) questionnaire that has been given:

a. Neck pain is felt by 4 out of 6 Man Power in the Wire Connection Soldering Process, with the calculation of the percentage of decline as follows:

$$Percentage\ Decrease = \frac{Initial\ Value - Final\ Value}{Overall\ Value} X\ 100\%$$
$$= \frac{17 - 6}{24} X\ 100\%$$
$$= 45{,}83\%$$

Pain in the neck area decreased by 45.83%.

Comparison of Rapid Upper Limb Assessment (RULA) Data Results

Comparison of Score Table C against the assessment of Man Power work posture for the Wire Connection Soldering Stator Line 4 Process using the Rapid Upper Limb Assessment (RULA) method after improvements were made by adding work aids in the form of magnifying glasses can be seen in Table 4:

Table 4. Comparison of Score Table C after Improvement

No.	Score Table C Before Repair	Score Table C After Repair	Percentage of Score Decrease Table C
1.	6	3	42,86%

Then the percentage of decrease in work posture assessment was calculated using the Rapid Upper Limb Assessment (RULA) method based on the results of Score Table C, as follows:

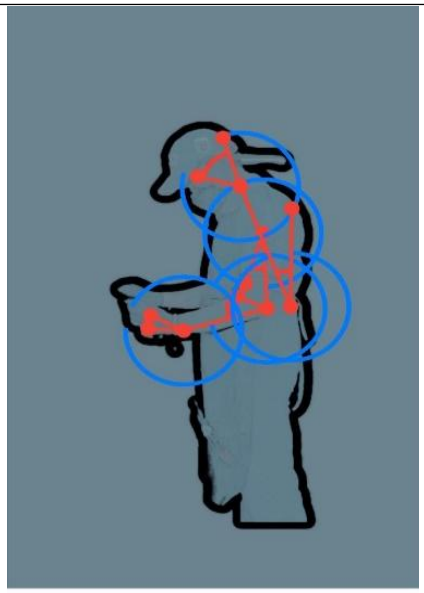
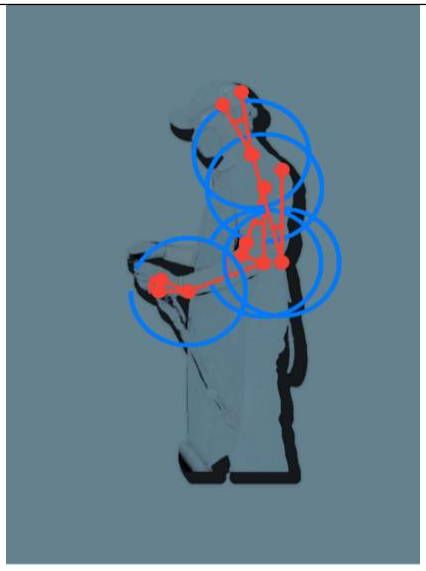
$$Percentage\ Decrease = \frac{Initial\ Value - Final\ Value}{Overall\ Value} X\ 100\%$$

$$= \frac{6-3}{7} X\ 100\%$$

$$= 42{,}86\%$$

The following is a comparison of the work postures formed from the Man Power of the Wire Connection Soldering Process after improvements were made with the addition of a magnifying glass work aid, which can be seen in Table 5:

Table 5. Comparison of Work Posture After Improvement

No.	Working Posture Before Improvement	Working Posture After Improvement
1.	 Measurement : A. Upper Arm position : 21.0° B. Lower Arm position : 40.5° C. Wirst position : 23.7° D. Neck position : 57.2° E. Trunk position : 21.7°	 Measurement : A. Upper Arm position : 16.4° B. Lower Arm position : 43.0° C. Wirst position : 24.2° D. Neck position : 19.6° E. Trunk position : 14.4°

5. Conclusion

Conclusion

1. Factors causing the high number of RULA (Rapid Upper Limb Assessment) method calculation results in the Wire Connection Soldering process, the unsafe working posture is due to the Man Power's view distance to Terminal B which will be soldered being too far and causing muscle tension and excessive static loading during work, Based on the level of risk of injury from the calculation results using the Nordic Body Map questionnaire, Man Power in the Wire Connection Soldering Process complained of pain in the neck, shoulders, back, and waist areas.
2. Efforts to improve the Man Power's work posture in the Wire Connection Soldering Process by adding a Magnifying Glass and Poka Yoke Camera Soldering work aids in the Wire Connection Soldering process. The Magnifying Glass work aid functions to change the Man Power's view distance to be closer to the terminal and Wire Assy to be soldered. Poka Yoke Camera Soldering functions to prevent negligence of terminal B not being soldered or Claim No Soldering due to human error, Poka Yoke Camera Soldering is based on the principle of being a decision maker (Adjustment) regarding the quality of the soldering results on terminal B, If the soldering results do not match the Master Check Soldering then the Stopper Pallet on the Conveyer cannot go down and the Pallet Jig cannot be shifted.
3. Based on the results of the Nordic Body Map (NBM) questionnaire, there was a decrease in the score of the location of complaints of pain in the neck by 45.83%, a decrease in the score of the location of complaints of pain in the Shoulder by 20.83%, a decrease in the score of the location of complaints of pain in the Back by 45.83%, a decrease in the score of the location of complaints of pain in the Waist by 29.63%. Then the Final Score of the assessment using the Rapid Upper Limb Assessment (RULA) method saw a decrease in the score of 42.86%.

Suggestions

As the end of this research, the suggestions or proposals from the research results that have been conducted on Man Power Process Wire Connection Soldering Stator Assy Line 4 are:

1. The need to improve work methods so as to reduce fatigue, excessive static loading during work and the risk level of Man Power Process Wire Connection Soldering being exposed to Musculoskeletal Disorders (MSDs), this will affect the level of production effectiveness and quality of the products produced, so that it can be done in several ways, including:
    a. To reduce muscle tension and pain in the neck, shoulders, back, and waist, Man Power Process Wire Connection Soldering can change their working posture periodically until they find the most comfortable working position so as not to cause repeated pain.
    b. Pay more attention to Man Power Process Wire Connection Soldering by providing work facilities that are in accordance with the human itself (Ergonomic) especially for employees who have not experienced excessive static loading during work so that there are no injuries or complaints in the future.
    c. Tools that function as aids that support performance and comfort should be provided for Man Power at each work station.
2. Further research is expected in the design of work stations to use better applications.

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