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Design of a welding table as a medium for determining elbow points and joints

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ABSTRACT

Welding is a method of joining two or more metals with electrode extension media using current heating and voltage according to the variation in the thickness of the iron material used. Welding is one of the connection media with a patent system, meaning that the results of the process can be changed by damaging the results of the welding process. From looking at several welding workshops, almost all of them to do welding are under or on the ground so many workers complain that they tend to be more tired and the welding results are less than optimal, especially for symmetrical or straightness of the connection results. The method used in this research is to design a welding table that is adjusted to the level of needs, especially for the height of the table and the centric axis to combine so that the results of the connection process are completely straight and reduce the results of welding defects. The purpose of designing this welding table is to use it as a method for working on the welding process so that the welding results are really strong and straight according to the design drawing. From the results of the design process, a welding table is obtained with iron material as a table base to place the workpiece to be cut. using borders of iron with a thickness of approximately 120 x 240 x 40cm using Material: Iron plate about 5-6 mm thick. In addition, the results of the design process also reduce the welding process time for blunt joints from 85 seconds to 48 seconds, overlap joints from 85 seconds to 60 seconds, and T joints from 88 seconds to 81 seconds. The quality of the welding results is visually better, the results of welding defects are smaller and straighter or symmetrical.

Keywords: Table; welding; connection; elbow

1. INTRODUCTION

The rapid development of technology today encourages Indonesian people to always improve [1]. The resources it has are both skill and theoretical so as not to miss the competition both with its nation and with the nation. Dead joints (Welding) and connections that can be disassembled and installed. This study will discuss making a welding table as a medium in determining the elbow point and connection. 4.0 is the development of the times accompanied by the rapid increase in science and technology (IPTEK) today creating an era of globalization and openness that requires every individual to participate in it, so that human resources must master IPTEK and be able to apply it in every life. Welding is simply an integral part of the growth of industrial improvement because it plays a major role in the engineering and repair of metal production [2][3]. It is almost impossible to build a factory without involving welding [4]. In the current area of industrialization, welding techniques have been widely used in the joining of rods in steel building construction and machine construction [5][6]. The widespread use of this technology is because buildings and machines made with joining techniques become lighter and simpler in the manufacturing process [7][8]. The scope of use of welding techniques in the construction field is very broad, including shipping, bridges, steel frames, pipelines, vehicle housing, and so on [9][10][6].

Design is a process that aims to analyze, assess, improve, and develop a system, both physical and non-physical systems, that is optimal for the future by utilizing existing information [11][12]. But with

the design of making a welding table, it is hoped that it can produce maximum straight welding and reduce the level of defects in welding [13][14]. This welding table is equipped with a Ragum/Peg as a material binding material that will be processed in welding so that the connection process is easier and more stable. In addition, with this welding table, the position of the welder/welder is maximized and does not cause excessive fatigue because the height of the welding table is adjusted to the standard height of the table in general.

2. METHOD

This research is a descriptive study that aims to determine the working principles of welding and how to make a welding table [15]. The steps of implementing the research process of testing the design of welding media using materials and tools by the sop. In descriptive research, research activities carried out for the testing process and writing the results are only carried out after going directly to the field [16]. The data in this descriptive method is more varied, which can be in the form of numbers and can also be in the form of words [17]. The type of data used can use numbers commonly used in quantitative research and words in qualitative research. The flow in this research is described in the process in Figure *1*.

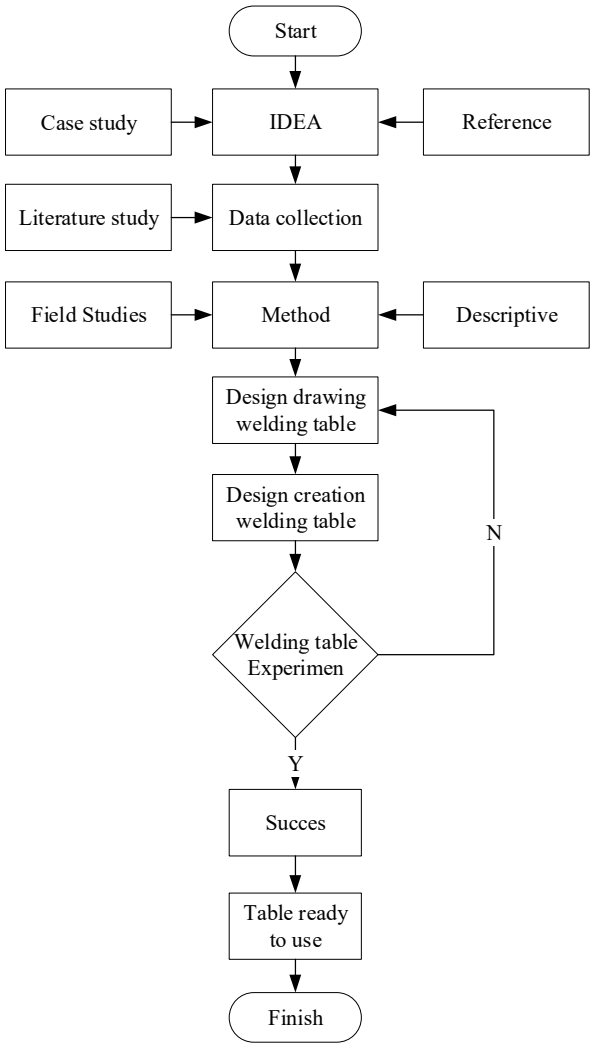


Figure 1. Flow in research.

Figure *1* this research activity, starts from ideas and symptoms that exist in the field about how to maximize the welding process and the results are by the working drawings after being carried out by looking for several references about making welding tables from the beginning to the final preparation of the table. From the reference we collect the data needed by determining what methods are suitable

for solving problems in this study. After that, we designed the table formation drawing from several materials that have been adjusted to the working drawings according to the initial dimensions that have been determined. After the table is finished, we do testing to place it as a determination of the elbow point and angle in the welding process and finally the output is the publication of scientific journals.

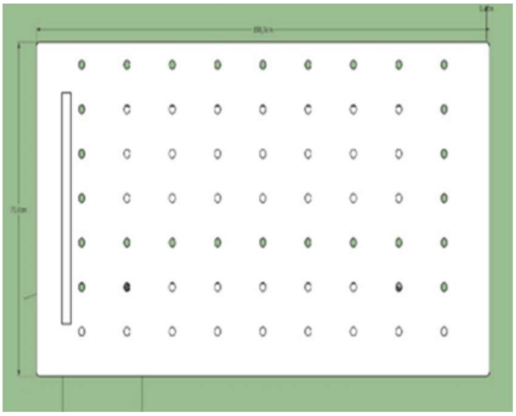
In research activities with the title Design of Welding Table Making as Media in Determining Elbow Points and Connections using the application method directly in the field using simple tools and materials available in the welding workshop. The tools and materials used are as follows: 1) Hollow iron is a box-shaped or rectangular construction material with a cavity in the middle so that its shape resembles a pipe. Hollow iron is widely used by consumers as both interior and exterior products. 2) Iron Plate (Table Base) Iron plate means iron in the form of sheets has a flat surface and is one of the main raw materials in the world of construction and fabrication. The iron plate has a shape and size that resembles plywood with a standard size of 4 'x 8' (1200 mm x 2400 mm). It's just that the plate is not made of wood but made of iron or steel. Another name for iron plate is eser black plate. Black plate is often used as a basic building material. Black plate is also often used as a connection in construction. The reason is that the material used is less difficult to do if using plate iron with a whole size. In addition, the plate can also be used as a base, door/fence lining, and water tank fabrication. The iron plate is one of the main raw materials in the world of construction and manufacturing. Its functions are quite diverse, namely as a base, door/fence layer, and fabrication of water tank manufacturing. The iron plate consists of several types, namely black plate, ship plate, and borders plate with the following explanation. 3) Tools and Materials: In field research, tools are needed to facilitate the implementation of research:

Table 1. Research tool specifications.

No.	Tool Name	Specifications
1	Lakoni Welding Machine	Power 900W-220V,10-120 A
2	Modern Hand Grinders	Voltage 220-230V, Frequency 50-60 Hz
3	Modern Drilling Machine	550W Power, 220V Electricity
4	Angle ruler	Type RRT 30 Cm
5	Meter	Modern type 6M
6	Grinding Eye	Type gestar and Fujiyama
7	Drill bit	4mm and 4.5 mm nachi type
8	Electrodes	Type NK-68, 2.0X300mm
9	Putty	Pottler lux/polyester
10	Hollow iron	Thickness 1.0 mm
11	Iron plate	2.5 mm thickness
12	Gray primer	Water-based acrylic material

3. RESULTS AND DISCUSSION

From the results of the research described above, it can then be determined the results of the study that the welding aid table that has been produced can improve the position of the welder's work posture or those who carry out welding activities and reduce the length of working time when welding, with the following explanation. The results of the design of the welding practice table can improve the position of the body of the welder when welding which was originally done in a squatting position to standing and reduce the percentage of back complaints so that the effectiveness of the time used in welding will be maximized. From the results of the welding table, the average height of the table is 100 cm and the appropriate length to put the weld material is 150 cm, and a width of 75 cm. The table resulting from the design process is made hollow which functions as a chamfer or pelorus so that the connection process will be more symmetrical, and straight. Based on the design drawing by the size of the specifications of each component used in the manufacture of the welding table, it can be found that the maximum weight of objects that can be processed on the welding table is 35kg, with a maximum length of 20 cm, and a width of 90 cm. The picture below is the result of designing a welding table that is used as a search, straightening the elbow point and connection.


Welding table top view

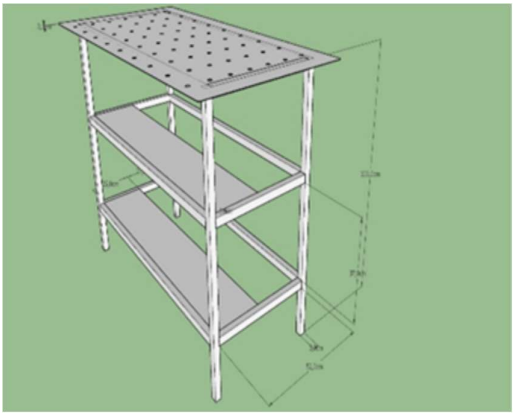
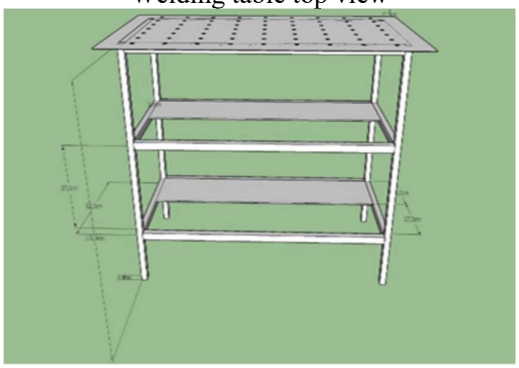
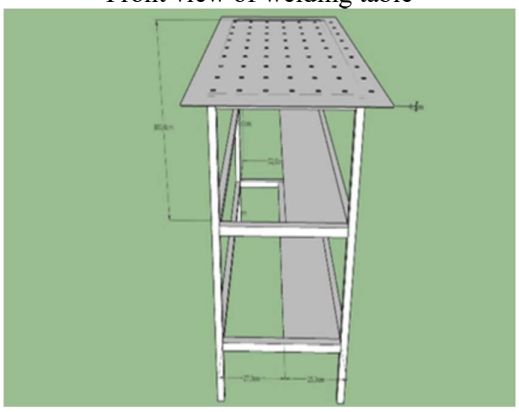


Image of welding table perspective view


Front view of welding table


Working process picture


Side view image


Final drawing of the welding table

Figure 2. Research work process.

Figure 2, is explained from the beginning of the research using design drawings until it becomes a table and can be used to determine the elbow points and welding angles. The process of making this welding table is the first to make a working drawing as a reference in measuring the dimensions to be worked on after that we just look for what material can be made for the welding table which is stronger and resistant to sparks from the welding flame. From the determination of the material, we then do the cutting process according to the size of the working drawing, then carry out the assembly process and the last coloring at the same time we do testing using welding media. From the results of research conducted by making a welding table to determine the elbow point and angle, a welding table design is obtained that can be used to determine straightness when welding both with hollow and shaft materials from making this table it is hoped that it can minimize damage caused by less straight or angled joints.

4. CONCLUSION

The results of the research process with the title of the design of making a welding table to determine the elbow point, it is found that the design of the welding table focuses on simplifying the placement of tools used in welding such as hand grinders, files, steel brushes, slag hammers, welding masks, glasses, gloves, and others. Then this welding table also focuses on solving the problems that occur when carrying out activities for connecting two or more materials which are usually carried out on the floor, causing the welding process to be less than optimal in terms of results and strength, especially the welding position carried out by welding in a squat position so that it often causes complaints of pain or pain in the back. The design of the welding table, with the design of the welding table, to helps the welding process to be more precise, especially in determining and maintaining the elbow point (90-degree angle) on metal joints. Before the welding process is carried out, the elbow point is determined using a measuring instrument such as a welding elbow (welding square) to ensure the angle is really at a 90-degree position. In addition, the advantage of this welding table has High Precision to increase the precision and quality of welding joints. as well as reduce the processing time and be safer from the level of work.

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