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# Learn Welding Techniques to Improve Work Skills in Vocational School Students

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**ABSTRACT**

Welding training is a learning activity about the science and practice of welding, so that the trainees know the correct welding methods and can practice them. It is hoped that this training activity can become one of the competency provisions for the training participants, in this case the youth of the Pondok Benda sub-district, South Tangerang. In order for this activity to run smoothly, a scientific method was established, namely a theoretical explanation of welding and practice. The participants in this activity were teenagers who were members of the Pondok Benda sub-district, South Tangerang youth organization, which totaled 45 people. The activity was carried out at the community hall RW 014 Pondok Benda, South Tangerang, on Saturday, July 30 2022. This activity went smoothly and the participants were very enthusiastic. It was evident that many questions were asked, the participants' responses were very enthusiastic, and the participants were very enthusiastic about participating in the welding practice. This activity was welcomed positively, because according to one of the training participants, this activity can form welding skills that are useful for the world of work.

**Keywords: Welding, Skills, Engineering, Welding Management, Entrepreneurship**

## INTRODUCTION

The Central Bureau of Statistics records that the open unemployment rate in Indonesia is quite large in aggregate. It is recorded that until the end of 2022 there will be more than five percent of the unemployed from the total population. Every year there is an increase in unemployment of around one million people, both from educated and non-educated circles. Even during the three years of the pandemic, an increase in the unemployment rate was recorded by 26%, and what is even more sad is that the highest number of unemployed was in the educated group (Purnomoratih, 2021), from graduates of vocational schools and tertiary institutions (Rosalina, et al., 2018).

Increasing unemployment among productive young people indicates that the availability of jobs is very limited (Abrar, et al., 2019; Pratiwi & Kurniawan, 2021). This is of course caused by many very complex factors. However, one very realistic solution to realize is through efforts to increase the number of entrepreneurs, especially among

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productive youth (Maukar, 2019), which in this case can be represented by youth groups in villages or at least at the sub-district level. One alternative solution is to empower the younger generation to be able to become entrepreneurs through training in commodity production skills that can be easily accepted by the market (Subekti, et al., 2022; Ahmad, et al., 2020). Strategic targets are community groups that have been organizationally formed down to the sub-village level.

Welding is a connection technique by partially melting the filler wire with or without pressure (Bhirawa, 2021). The scope of the use of welding techniques in construction is very broad, including shipping, bridges, steel frames, pressure vessels, fast pipes, pipelines and so on (Jalil, et al., 2017). Apart from manufacturing, the welding process can also be used for repairs, for example to fill holes in castings (Bakhori, 2017). Making weld seams on tools to thicken worn parts, and other kinds of repairs. Welding is not the main purpose of construction, but only a means to achieve better manufacturing economics. Therefore the design of the weld and the method of welding must pay attention to and show compatibility between the properties of the weld and the use of the construction and the uses around it (Arifin, 2017).

Between the two classifications mentioned above, it seems that the method of work classification is more widely used because of that the classification described in this chapter is also based on the method of work. Based on this classification, welding can be divided into three main classes, namely liquid welding, pressure welding and brazing (Jazi, et al., 2022).

Liquid welding is a method of welding in which the joint is heated until it melts with a heat source from an electric arc or a burning gas flame source (Santoso, et al., 2016). Press welding is a method of welding in which a joint is heated and then pressed together. Brazing is a method of welding in which the joints are bonded and joined together by using an alloy of materials that have a low melting point.

Electric arc welding or as it is generally called, includes a process of joining glass using electricity as a heat source (Shieddieque, et al., 2021). So the heat source generated by the arc of electric current, between the welding electrode and the workpiece. The workpiece is part of the welding electric current flow circuit. The electrode melts together with the workpiece as a result of an electric arc. The arc movement is arranged in such a

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way that the melted workpiece and electrode (Suherman, et al., 2020) after cooling can become one part that is difficult to separate. This type of connection is a fixed connection.

Some of the added material is used by an electrode without a membrane which is moved and brought closer to the arc that occurs between the tungsten electrode and the base material. As a shielding gas, argon, helium or a mixture of the two gases is used, the use of which depends on the type of glass to be welded. TIG welding rods are usually cooled by circulating water. In this Community Service activity, intensive training will be carried out in the field of welding, starting with the addition of skills that are useful in supporting the emergence of creative new entrepreneurs, increasing*life skill*, and collaborative marketing patterns.

## METHOD

In problem solving which includes improving youth skills, as a strategic intermediate goal in designing and making handicraft products, training in the welding field so as to produce marketable commodities and involving youth organizations in the Pondok Benda Pamulang sub-district.

1. Solution to problem

   Improving the skills of productive age Setu sub-district community groups, especially those who are unemployed, production through the results of welding training as indicated by product quality and acceptance by consumers. Formation of business groups in the field of welding that are capable of becoming centers of handicraft production that are acceptable to the market in educational institutions. Availability of a collaborative empowerment system so that it can be used in developing more intensive collaboration between youth organizations and the academic community.
2. Activity Target

   This welding skills training activity was aimed at youth organizations in the Pondok Benda sub-district, South Tangerang, with a total of 45 people.
3. Place and time
4. This activity is located at the RW 014 Residents' Hall, Pondok Benda Pamulang, South Tangerang. The activities will be carried out on Saturday, 30 July 2022.
5. Activity Method

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This activity is carried out in two ways, namely explaining the theory and practice of welding.

## DISCUSSION

Service activities packaged in training are carried out in two ways, namely explanation of welding material and practice. The following is presented about the theory of welding.

### Manual Electric Welding Theory

In this welding, the base metal experiences melting due to heating from an electric arc that arises between the tip of the electrode and the surface of the workpiece (Pratama, et al., 2020). The existing electric arc is generated from a welding machine. The electrode used is in the form of a wire covered with a shield in the form of flux and because of that the welding electrode is sometimes called a welding wire. The electrode during welding will experience melting together with the base metal which is part of the weld seam (Asmaun, et al., 2020). With this melting, the weld seam will be filled with molten metal from the electrode and base metal.

### Classification Ignition Techniques

Make sure the welding machine is ready to use and use safety protective equipment.

1. In general, the E 6013 electrode with a diameter of 3.25 mm is used for training.
2. Pinch the non-webbed end of the electrode in the electrode clamping pliers. If it has been clamped, the electrode has been electrified, be careful of touching the electrode with the work table, because ignition can occur.
3. Stand in a comfortable position to be able to follow the movement of the electrodes. Do not hold the electrode holder too tightly or rigidly. With a relaxed movement it will make it easier to ignite and draw the bow.
4. Point the tip of the electrode to the workpiece with an electrode angle of approximately 70 degrees to the surface of the workpiece. Lower the tip of the electrode to be ignited so that it reaches 30 mm above the surface of the workpiece. Now lower the face shield (welding helmet).
5. Light the arc by scratching the tip of the electrode on the surface of the workpiece like scratching a match on the surface of the workpiece. When you start to see an arc, pull the electrode up to approximately 6 mm, return the electrode to the ignition

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position then reduce the arc height until it is as big as the diameter of the electrode core wire (face and eyes must always be protected by a welding helmet.

6. Repeat this exercise until it produces good arc ignition and a fixed arc height. To turn off the arc, the electrode must be lifted quickly, this is intended to prevent the tip of the electrode from sticking to the surface of the workpiece.
7. If the electrode is firmly attached to the workpiece, the welding machine is immediately turned off and then the electrode can be removed.

The increasing unemployment among productive young people increasingly shows that the availability of jobs is very limited. This is of course caused by many very complex factors. However, one solution that is very realistic to realize is through efforts to increase the number of entrepreneurs, especially among productive young people, which in this case can be represented by Karang Taruna groups in hamlets or at least at the sub-district level. One alternative solution is through empowering the younger generation to be able to become entrepreneurs through training in commodity production skills that can be easily accepted by the market. Among the strategic targets are community groups that have been organizationally formed down to the sub-village level. Welding is one of the joining techniques by melting some of the filler wire with or without pressure. The scope of the use of welding techniques in construction is very wide, including shipping, bridges, steel frames, pressure vessels, penstocks, pipelines and so on. In addition to making construction, the welding process can also be used for repairs, for example to fill holes in castings.

Making weld seams on tools, thickening worn parts, and various other repairs. Welding is not the main objective of construction, but only a means to achieve better manufacturing economy. Therefore the design of the weld and the method of welding must pay attention to and show compatibility between the properties of the weld and the use of the construction and the use of the surroundings. The welding procedure seems very simple, but in fact there are many problems that must be overcome where the solution requires a variety of knowledge.

Therefore, in welding, knowledge must accompany practice. In detail, it can be said that the design of building constructions and machines with welded joints must also be planned regarding the methods of welding. Methods of inspection, welding materials, and types of welding to be used, based on the function of the designed building or machine

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parts. Based on the definition of*German industry standards,* welds are metallurgical bonds in joints. From this definition it can be further explained that welding is a local connection of several rods, wires using heat energy.

From the results of the training and theoretical understanding delivered during the Community Service training it is expected.

1. Improving the skills of the people of Setu sub-district, South Tangerang city as a strategic intermediate target in designing and making handicraft products from training in the field of welding so as to produce marketable commodities.
2. Involving students in improving the skills of the Setu sub-district community in productive activities through educational institutions as a strategic main goal in designing and making training in the field of welding.
3. Build a network in the form of community production groups and open access to marketing through partnerships with related agencies
4. Develop collaborative empowerment patterns through assistance in transferring skills, capital and broader marketing access.

## CONCLUSION

The results in the form of partnerships to date can be seen from the cooperation agreements from both the community, related agencies and the service team concerned. Formally, this form of cooperation is manifested in the form of regular consulting and monitoring activities in classes that have been agreed upon to provide learning in developing welding training learning tools. The ability of the Pondok Benda sub-district community in South Tangerang to carry out welding training has increased as can be seen from the discussions between the activity committee and the participants. This increase in ability is easy to predict because they have never had training in the field of welding before.

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