

Utilization of Three Dimensional Printers as a Production Tool

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ABSTRACT

A 3D printer is a product resulting from the development of a product. As a product, a 3-dimensional printer has its value as an object with a function because with its function as a printing tool; the printer can produce an object in physical form. So that it can produce real objects as the output. By using a qualitative descriptive method, this research gets the result that all elements contained in a 3-dimensional printer can not only produce a real object that is following its initial function. In line with the method, this study aims to explain the function of a 3-dimensional printer, which can directly produce products. Other than that, 3 Dimensional printers are now present as tools that can make objects real. So that it has a positive impact on the creation of an object. 3-dimensional printers are still owned by limited circles, but indirectly it can influence potential users of these tools in the form of demands regarding knowledge in the process of making an object using a 3-dimensional printer.

Keywords: Utilization, Printer, 3 Dimensions, Tools, Production.

1. BACKGROUND

The presence of a tool that leads to its use cannot be separated from its manufacture because the manufacture is known as the technical relationship between the factor of the producer as an input and the result as an output [1]. Because with this basic thing, it is said that it can be done for many things such as production, technology, industry, or leading to the economy as a whole [2].

A manufacturing process will provide an overview of technically efficient production methods and the emphasis on the various components of its manufacture. This is exemplified by the amount of raw material used, labor, and manufacturing time [3]. The manufacturing method can be applied because the existence of an efficient manufacturing method can be hopeful. After all, it can emphasize expenses that tend to be wasteful and emphasized the function of the method [4].

3D Printer is a tool used to create an object from various processes in which material is combined or compacted under computer control to create three-dimensional objects [5]. 3D printers are often termed layered manufacturers which are defined as a process of rapid prototyping or additive manufacturing, namely the development of layered manufacturing to build solid volumes from CAD models by adding layers of material

after successive layers[6]. Because it is made of part from layer to layer, it can build orientation as well as improve the quality of the part in terms of accuracy and surface finish. Which can directly emphasize and influence production costs [7].

The 3D printer is a product that is produced due to technological innovation. It is often used as a tool to make product prototypes [5]. It can be developed into a tool used for the product development process divided through the digital modeling stage, CAD-CAM, 3D printing modeling production, prototype production with the use of a 3D printer, evaluation, and revision [8]. Not only from the prototype but also through the use of software because it can be said that the process carried out by the 3D printer is a one-way process. Therefore, in a 3D printer, care is needed before going through the manufacturing process [5].

Product development based on technology is recognized as having a significant contribution to human life [9], so in line with this, the purpose of this research is to produce new information about the presence of a tool in the form of a 3-dimensional printer that can produce real objects directly [10].

2. METHOD

Qualitative descriptive research is known as a type of research that is included in the type of qualitative research, which aims to reveal events or facts, circumstances, phenomena, variables, and circumstances that occur during the research[11]. This method is used to interpret and describe the data concerned, the views that occur, and the relationship between the variables that arise, the differences between existing facts and their effects on a condition, and so on [12].

The principle of the research carried out is to understand the various things of a 3-dimensional printer from the user's point of view [13]. In addition, the benefits and constraints received by its users when producing real objects using these tools [14].

One of the uses of a 3-dimensional printer has had a significant impact when viewed from its use as a tool to make things [15]. Because the 3-dimensional printer directly provides various facilities to get objects that are not only visually but physically shown in Figure 1. Therefore, the existing developments due to the presence of 3-dimensional printers can be analyzed in terms of their utilization in a production process [16].

3. RESULTS

3.1. 3 Dimensional Printer

3D Printer is known as a tool that is used to create 3-dimensional objects. Besides, by using a 3D printer, an object can be created or printed as desired by using a 3-dimensional digital format resulting from the use of the software [17]. With the 3D printer, the 3D form that appears visually can have the volume to have the touch and touch value [18].

On the current development, 3D printers are often used for small-scale industries, home industries, and even support businesses, which are often widely circulated as a 3-dimensional printing service [5].

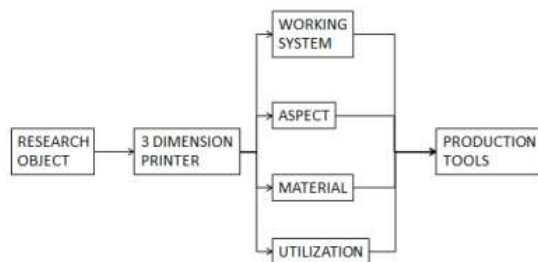


Figure 1 Analytical methods and techniques performed.



Figure 2 Three Dimensional Printer.

Therefore, a 3D printer can be described as a technology-based tool that functions to create 3-dimensional. Figure 2 shows real objects through a digital process that adds material to the objects used to obtain the desired shape. Objects created using a 3-dimensional printer have limitations due to the limited printable fields available from the tool itself. Directly, it can affect uptime and material usage [7].

3.1.1. Aspects in a 3D Printer

3D Printer is known as a tool that functions to produce real three-dimensional objects through the process of laying layers derived from special materials to produce the appropriate shape from digital files [17]. In addition to its function, the results obtained from using a 3D printer can be directly applied as a prototype model, as a scale model (mockup) even in its development, can also be used as a printer, medical devices, and props [19].

In today's development, printing equipment is one of the most frequently used technological tools. Printing has become one of the fastest-growing fields because the application has been wide since the creation of the printing tool. After all, fractions do not start from a 3D object [4]. However, through a 2D printer (paper printer), which initially produced a variety of writing developed in Figure 3, it became a visual printing tool to build a shape [5]. However, along with the development of technology, 3D printers are present as a tool that results from visual developments required to produce real objects [8].

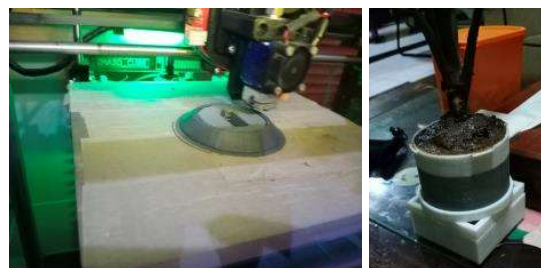


Figure 3 Application of a 3-dimensional printer.

The difference in 3D printers is that they do not use ink to print. Nevertheless, the type of plastic molten wax can easily produce the desired object [20]. And the use of software that can be used for 3d printers is already

present as software that is capable of producing shapes with the concept of 3 axes (x, y, z) or, in other words displaying data in 3D format [21].

3.1.2. Materials used in the 3D Printer

Materials or can be called raw materials are materials used to manufacture products where the material is fully visible in the finished product or constitutes the largest part of the goods [22]. Which is generally known as the basic component for the manufacture of a product where materials can be converted into other forms through certain processes [19].



Figure 4 Materials applied to a 3-dimensional printer.

In applying a production process that uses a 3-dimensional printer, the material used is a material that has easy to melt properties [15]. This is because, in the process, the material used is melted in hot conditions with a certain minimum limit to be used as a layer [23]. And the material used is a kind of thermoplastic that is made into a filament or a type of rope made from plastic [20].

Also, in the current development, there are several filaments which are developed into materials resulting from a combination with other materials [22]. So it is not uncommon for the need for the melting point of the filament to increase, as depicted in Figure 4. Not only the melting point, the components, and the working time of the tool also need to be adjusted to produce a physical object that looks like the actual material [24]. However, in this case, it is not uncommon for the function of the physical object to be reduced or not even representative [25].

3.1.3. 3D Printer working system

The 3-dimensional printer is one of the tools that resulted from an industrial technology development known as the additive manufacturing method [17]. Namely, a method or technology adds such a simple sequence of materials and value in creating physical objects or in the production process of manufactured goods [19].

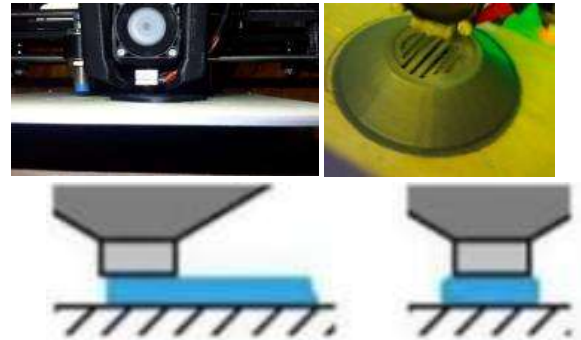


Figure 5 The additive manufacturing method of a 3-dimensional printer.

During its development, the additive manufacturing method is a technology that has been applied by manufacturing-based companies [4]. Furthermore, this technology is back into development through the presence of 3-dimensional printers [3]. Because it relates to technology development. 3-dimensional printers that were originally only owned by the manufacturer [1]. Currently, it has become a tool that can be accessed by the wider community. So that with this development. A technological object can be applied to a broader need [18].

Additive manufacturing methods do not only focus on manufacturing finished goods. However, in a relationship, it will affect the use of tools, the use of materials in rapid tooling, and the speed in producing prototypes with rapid prototyping [26]. In the method of use, several steps [27] are applied to produce physical objects using 3-dimensional printers: (1) Making 3-dimensional models using the software. Because directly, it can provide some scientific and virtual data that can be applied from physical objects; (2) 3-dimensional model conversion, which is one of the methods applied by the 3-dimensional model maker so that it can be read by the tools used, in the conversion method. Process control and determining the size to be applied are inseparable elements. This is because several considerations can be taken into account. Because it will affect the results obtained. The considerations that are considered are the processing time, the forming structure, and the amount of material used; (3) The printing process is done automatically. Therefore, in the core process that is carried out, it is necessary to ensure that there are no errors from the conversion and pre-calculation processes. Because in the additive manufacturing process, errors in the process must be corrected from the start. So that the process needs to be started again; (4) The last process is to clean some parts that do not belong to physical objects. Also, in this process, object cleaning can be continued to the finishing stage so that physical objects can be seen optimally. In the last process carried out, it is necessary to pay attention to the treatment of objects because it is not uncommon for objects made to have a minimum thickness so that they are brittle and easy to crack and even break.

These various methods are methods implemented in making physical objects using 3-dimensional printers. If applied, the entire method is implemented as a whole and following applicable operational standards to carry out the process of making physical objects describes in Figure 5.

4. DISCUSSION

4.1. Utilization of a 3D Printer

The 3-dimensional printer is known to be one of the products resulting from manufacturing additive technology that emphasizes the various influences on the production process and speed [6]. This results in the convenience of making prototypes or being able to make adjustments to the design in the short term. Which makes it easy to customize and differentiate objects [28]. But related to the speed in producing it. There is a lot of risks that will be obtained because of the limited human resources and tools such as the limitations of the printing field that have not been able to equalize large industries and the need for knowledge to improve one's skills to suppress manufacturing failures [29].



Figure 6 Form of 3-dimensional printer utilization.

It is known that the 3D printing process is still dominant in limited areas, such as modeling for the needs of physical objects of design [5]. Besides, the material used in general is still plastic as a result of industrial processing, which places more emphasis on mass manufacturing [24]. So it is not uncommon for the use of 3-dimensional printers, in general, to be applied in the context of a prototype where the results can be seen physically and functionally in Figure 6 so that they can be sampled to be shown [30]. Also, it can be used as a base material for molds for mass production. Moreover, as a tool for printing spare parts, this can speed up and facilitate limited printing [24].

5. CONCLUSION

Three Dimensional printers are now present as tools that can make objects real so that it has a positive impact on the creation of an object. Because with a real object, an object can be maximized in the parts contained therein. Because it is not only a real form but with it, function and strength can be seen directly. Even if, in practice, an object has the same material as an object made using a 3-dimensional printer.

Although, in practice, 3-dimensional printers are still owned by limited circles, it can indirectly influence potential users of these tools in the form of demands

regarding knowledge in the process of making an object using a 3-dimensional printer. Therefore, the impact generated by the presence of a 3-dimensional printer is not only for a process but can also affect humans in terms of knowledge.

AUTHORS' CONTRIBUTIONS

Author 1 Creating and designing research carried out and developing the theory used. Authors 2 and 4 Provide an explanation of the development of research and produce research objects to be reported to author 1. Author 3 and Author 1 Develop the results of examples of objects made using a 3-dimensional printer to be used as the results discussed in the study. All authors collaborated in discussing and contributing to the research manuscript.

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