

Vaporcelain, Installation and Work Tools Installing Ceramics

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Abstract—The incessant development of infrastructure in Indonesia is one factor in the increasing role of the construction sector in the Indonesian economy. This can be seen from the large percentage of the construction sector to GDP of 10.60% in the third quarter of 2019. One of the improvements is found in technological developments in the construction sector. Technology in the construction sector has an influence on the development of modern equipment that can increase the productivity of construction work, including ceramic installation work. The quality of the ceramic installation work is of concern to the constructor because the results that are done depend on the skills and abilities of the ceramic craftsman. The effort made is by making ceramic installation tools that have been designed to lift and level the ceramics at the time of ceramic installation work. Vaporcelain is made using the principle of the vacuum system and the grade system of the nivo and also made using easily available ingredients. Vaporcelain as a product is created with the aim of facilitating the finishing work of ceramic installation in a building, increasing the results of ceramic installation according to standards, and increasing the productivity of ceramists.

Keywords—ceramics, productivity, ceramic craftsman, vaporcelain

I. INTRODUCTION

The incessant development of infrastructure in Indonesia is one factor in the increasing role of the construction sector in the Indonesian economy. This can be seen from the large percentage of the construction sector to GDP of 10.60% in the third quarter of 2019 according to BPS. One of the reasons for this increase is the development of technology in the construction sector.

From every technological development that is created to provide positive benefits for human life in order to get something easier, as well as a new way to facilitate human activities. In the field of building construction, technological developments have made it easier for every expert in the field of civil engineering to construction workers. Technology has influenced, among others, the development of types of construction materials and modern equipment that support and facilitate construction work. With such developments,

contractors are required to have their work completed effectively and efficiently.

In a job, one aspect that is assessed to measure a job is successful or not in terms of quality. The quality of the results of the work is something that should be an important concern for construction implementers because the results that are done depend on the skills and abilities of the masons. By including an assessment of the quality of the results achieved, the estimated productivity of the masons will be closer to the objective value. An increasingly complete assessment like this really helps project owners in determining and placing masons according to their respective expertise, one of which is a ceramic craftsman in floor tile installation work. Based on previous research conducted by Zainuri, et al. in his journal that makes Malay Asri Housing and Mahkota Riau Housing as reference material for his research entitled "Analysis of Productivity of Ceramics by Taking into account the Quality of Results in Pekanbaru", states that the factors affecting the quality of work are the implementation of initial procedures, working methods, checking work with the highest quality productivity value obtained by craftsman 1 of 0.029 m² / minute with kenek 1 of 0.0273 m² / minute for an area of 15.23 m² of ceramics. Thus, in carrying out a ceramic installation work with a certain wide range also depends on the time provided. Other than that,

Vacuum technology we often find in cleaning tools. The vacuum system was chosen because it is easy to apply to materials that are easily available. Therefore, in the description above, vacuum technology is raised to be the answer to the existing problems.

II. RESEARCH METHODS

A. Ceramics

Ceramics are inorganic and non-metal materials. Generally, ceramics are compounds between metals and non-metals. To obtain the properties of ceramics are usually obtained by heating at high temperatures.

Ceramics from the engineering ceramic group have very high strength and hardness, have exceptional chemical stability and can be made with very tight dimensional tolerances [1]. Ceramic material is a material that has a bright prospect, considering that this material is a versatile material and has advantages over other materials. These advantages include resistance to high temperatures, and its formation is carried out in the colloid phase at room temperature (Lantu in Darwis, [2]).

Ceramics are a material that is widely used by Indonesians as handicraft products and as building materials. Products from ceramic crafts can be porcelain, tiles, jugs, sculptures, or crafts that do not receive a lot of continuous workload. Ceramics are composite materials that have better high temperature resistance, wear and corrosion than super alloys but have brittle properties (Subiyanto & Subowo in Setiawan [3]).

B. Vacuum

Vacuum is a condition in the room where some of the air and other gases have been removed so that the pressure in the room is below atmospheric pressure or a situation where the air is vacuum [4]. The basic principle of vacuum is a form of change from a defined pressure and volume. This tool is a technological innovation in the process of installing ceramics in a building. Installation of ceramics using this tool can help when removing and applying ceramics to the prepared mix also helps to see the evenness between the tiles installed.

The vacuum condition can be expressed as a pressure based on absolute pressure or vacuum. Absolute pressure is the pressure measured from the absolute zero condition which is usually expressed in Torr, mbar (millibars) or N / m² (newton.m² or pascal). The measurement of vacuum (vacuum) is based on the pressure of 1 atmosphere absolute or zero gauge (measured zero) which is usually also expressed in Torr, mbar or N / m².

In the 17th century, vacuum physics and technology were born. Galileo (1564-1642) was the first to conduct experiments trying to measure the force required to produce a vacuum with a piston in a cylinder. Furthermore, Torricelli (1608-1647), a colleague of Galileo, in 1644 succeeded in conducting vacuum experiments with a glass tube filled with mercury and closed at one end while the other end was open in a pool of mercury. Based on this experiment, it was found that the column of mercury was always at a height of 760 mm regardless of the length, shape or degree of tilt of the tube. This method (experimental) is a measurement of atmospheric air pressure and is the first experimental vacuum produced.

Vacuum technology always deals with gas laws. There are several laws related to gases: Boyle's law, Amontons law, Charles's law, Dalton's law, Avogadro's law and Graham's law.

The vacuum pump by moving gas is broadly divided into 2 (two) types, namely (1) a positive displacement vacuum pump and (2) a kinetic vacuum pump. The basic working principles of the two types of pumps are very different. The working principle of a vacuum pump with a positive step is to move the

gas (molecules / atoms) by sucking from the vacuum system, then the gas is compressed in the pump and followed by removing it from the pump. For a vacuum pump with kinetic energy is to provide or add molecular / atomic kinetic energy from the pumped gas so that it can move from a lower pressure to a higher pressure.

C. 3D Dimensions

Three-dimensional is an object or space that has a length, width, and height that has a shape or space. If we refer to a 3D object it means that the object has volume space. 3D objects also have locations at the X, Y, and Z coordinates. If they are in a 2-dimensional plane, they will only be able to move the object to the side.

Three-dimensional characteristics, refers to three spatial dimensions, that three dimensions denote a Cartesian, X, Y, and Z coordinate point. The use of the term 3D can be used in various planes and is often associated with other things such as additional qualitative specifications.

D. Blender

Blender is a package used for modeling and creating three-dimensional animation. Blender is an OSS (Open Source Software) or other software term that can be used in various OS (Operating Systems). It used to be developed commercially, but is now released under the GPL (GNU General Public License). This software has the ability to provide a strong texture to paint the surface on the model. Blender is also equipped with plug-and-play functions, so that the designed model can move. Blender has its own rendering engine and complex studio lighting like when shooting movies, although it also supports using renders outside of Blender.

Making 3-dimensional designs from concept designs that have been made using Blender software so that a 3-dimensional design is obtained. Blender is a package used for modeling and creating three-dimensional animation. Blender is an OSS (Open Source Software) or other software term that can be used in various OS (Operating Systems). It used to be developed commercially, but is now released under the GPL (General Public License). The minimum hardware specifications are 32-bit dual core 2GHz, 2Gb RAM, 1280x768 display, mouse or trackpad and have OpenGL 2.1 compatible graphics with 512 Mb RAM.

E. Drafting of Concepts

The drafting of the concept by sketching the initial design of the tool design is based on the data that has been obtained, namely: (i) secondary data of the suction cup or vacuum [5]. The data obtained from the literature is that the operation of the suction cup causes a difference in the atmosphere between the outside of the suction cup and the volume inside the suction cup causing the suction cup to remain attached to the surface. (ii) secondary data on ceramic specific gravity. The data obtained is 2.06 gr / cm³ for magnesium alumina silica ceramics from the volcanic ash of Mount Sinabung, so that if

the size of the ceramic used is 40x40 the total weight is around 3,296 kg.

F. The Stage of Making an Animated Video

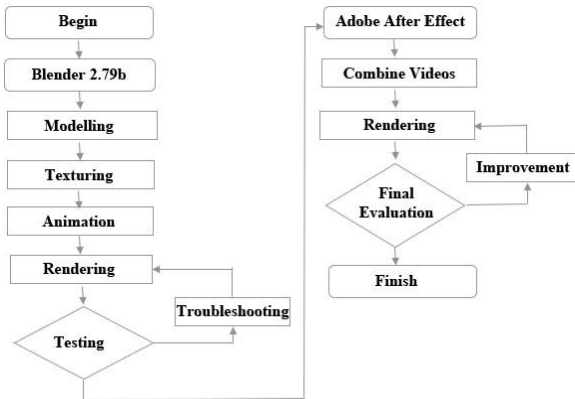


Fig. 1. Stage of making an animated video.

Before making an animated video, it is necessary to prepare a storyboard as a reference in making animated videos (Can be seen on figure 1). Furthermore, the first stage in making animated videos is modeling. The modeling stage is the stage of making shapes and forms. The model is made according to the mesh tool consisting of plane, cube, circle, UV sphere, icosphere, cylinder, cone, grid, etc. which can be used as needed.

The second stage is texturing. Texturing is the process of giving a texture or color to each object that has been created. The texturing process in the Blender program can use the materials or texture tools. Tools materials are used to give the basic color of the objects that we make.

The third stage is animation. After making the 3-dimensional model given a color, the next step is animation. Animation is the process of creating movements in an animated model that is adjusted to the storyboard. The purpose of making this animation is to be able to visually explain the tools we have developed.

The fourth stage is rendering. Rendering is the process of integrating each animated scene into an animated video. In this step, you can also adjust the camera position accordingly so that the model can be depicted clearly.

After all parts of the animation have finished the rendering process, all of these parts are put together into a complete animation video with the help of Adobe After Effects software. At this stage you can also add supporting audio and additional animation effects. The description of interface, visual, description, and duration can be seen on figure 2 below.

Interface	Visual	Description	Duration (second)
1		Opening, Member Introduction	15
2		background	30
3		Introduction and preparation of materials	65
4		The process of making tools	140
5		The working principle of the tools	50
6		Way of application	50
7		Visualization of the model	20

Fig. 2. The description of interface, visual, description, and duration

III. THE RESULTS OF THE RESEARCH

The results that are expected from this digital design include: first, the design concept related to ceramic installation aids is expected to be a design for making tools to help make ceramic installation easier so that it can increase the productivity of craftsmen. Second, it is hoped that the results of the activities can be published in a journal. Finally, the process of implementing 3-dimensional modeling can be used as a learning method for practical courses. Educators can make simulations on practical courses as a substitute for teaching and learning activities directly with virtually during pandemic conditions.

A. Design

The design of this tool was developed taking into account the comfort of the tool when it is used by workers later. Then you get the following design on figure 3 bellow:

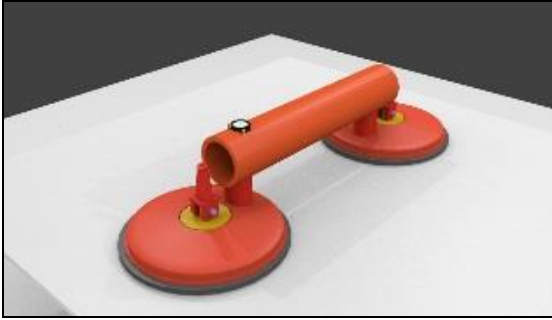


Fig. 3. The design.

To provide comfort for its users, the handle is made of iron with a diameter of 1 ¼ inch. In addition, the iron used is an iron pipe with a length of 35 cm so that it is light and comfortable when used by ceramists. With a concept that has been planned, the advantages of the tools we have developed with similar competitors are:

- No need to charge the battery
- Made with ingredients that are nearby
- Has the function of measuring flatness with the nivo feature

B. Animated Video

The making of this animated video is carried out according to a predetermined schedule of activities. Animated videos are created using Adobe After Effects and Blender software. In the process of making a vacuum device, it has been through the design of a tool design from various kinds of literature studies where the design of this tool uses the law of airtightness when the condition of a room becomes empty, so that an airtight room will cause a strong sticking effect.

IV. CONCLUSION AND RECOMMENDATION

Technological developments are inevitable in today's life, because technological advances continue to develop along with advances in science. In the field of building construction, technological developments have made it easier for every expert in the field of civil engineering to construction workers.

Therefore, in the development process, technology is needed that can help simplify and speed up the process but with the best load. The quality of the results of the work is something that should be an important concern for construction implementers because the results that are done depend on the skills and abilities of the masons. The use of equipment by a trained and experienced workforce is able to produce standard pairs, one of which is in ceramic installation. The goal to be achieved is to simplify the ceramic installation work and increase the productivity of the construction workforce. Efforts can be made to achieve the goal, one of which is by making ceramic installation aids that have been designed to lift and level ceramics during ceramic installation work. The manufacture of this tool will make it easier for workers to install ceramics, increase the results of ceramic installation according to standards, and increase the productivity of the construction workforce.

It is expected that in planning a design there must be theories that support the creation of the product and pay attention to existing standards. In addition, in using the blender software, it is recommended that you have expertise that can be obtained from watching learning videos about blender software which can be seen through the YouTube channel. Furthermore, one of the important supporters in carrying out an activity is good coordination between group members and other parties so that everything can run well.

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