MOBILE CONFINE SPACE SIMULATOR

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ABSTRACT

Work in a confined space has a danger of the health and safety of the labor. The confined space contains some dangerous sources of chemical danger, physical danger, or mechanical danger. A confined space is a one that has limited or restricted openings for entry and exit, one with unfavorable natural ventilation and one that is not designed for constant human occupancy, for example, sewage tanks, pump rooms, and tankers.A mobile confined space simulator is a confined space used by industry to train and issue occupational licenses. There are some problems faced by the industry using the confined space simulator. In this report, there are some issues faced by the industry such as NOSH GLOBAL in operating the mobile confined space simulator that can be identified after doing some research on the existing mobile confined space simulator.In this report, there are several limited simulator spaces available based on studies available on the internet. Based on the mobile confined space simulator that has been studied, several comparisons have been made based on the sketches and materials used by the mobile confined space simulator. Besides, the methodology is also involved in the development of a new mobile confined space simulator. Based on the methodology that has been performed, there are several processes involved in implementing the construction of the confined space simulator including cutting process, welding process, assemble and finishing. Based on the analysis data can be identified as the cost used in the construction of the mobile confined space simulator. In addition, there is a cost of manufacturing in the completion of this project. In conclusion, the mobile confined space simulator can help make it easier for employees to adjust to the actual work environment.

Keywords : confined space simulator, automobile confined space simulator.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Confined space "means an enclosed or partially enclosed space under atmospheric pressure during a stay and is not intended or intended for work, and the enclosed space is a high-risk area of the work site where the death of the worker and the rescuer shall be the same. Examples of confined spaces including tanks, ships, silos, storage bins, hoppers, vans, holes, holes, tunnels, housing equipment, drainage works, and pipelines.

Not surprisingly, very specific rules need to be followed by workers working in and around this space. Therefore, it is important to recognize the dangers associated with confined space and the tasks required therein, as well as the limited space rescue mission.

The confined space simulator has one or more of the following features:

i. Confined space has the potential to create a hazardous environment for the workforce.
ii. It has a wall around it and a smaller area that can trap or deter workers.
iii. It contains various other recognized safety or health hazards, such as unprotected machinery, exposed wires, or heat stres

Figure 1.1.1. Route for rescue

Figure 1.1.2. Route for rescue

The hazards must be assessed and an adequate timely response must be ensured based on the potential hazard facing a worker. For example, if workers are in danger in the confined space, a timely emergency removal system would be the difference in minutes that make it a rescue rather than retrieval. Rescue personnel must be available for immediate implementation of the on-site rescue procedures.

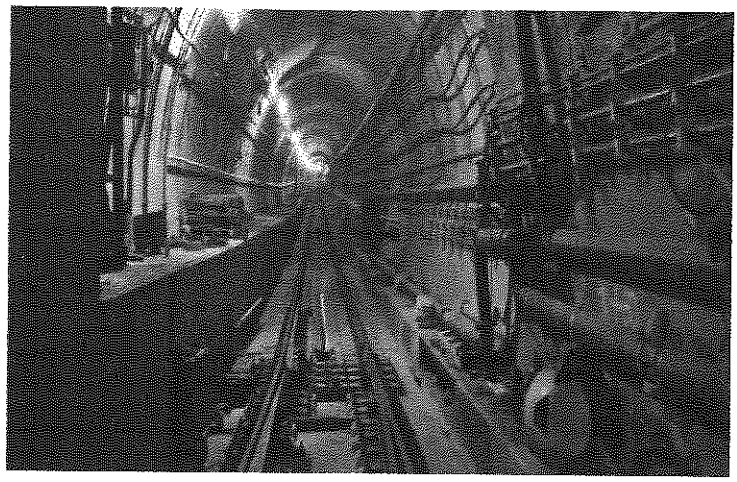

Figure 1.1.3. Confined space.

1.2 Background of Problems

Many industries are facing the need to provide complete services and rescue to incoming and outgoing workers in confined spaces.

Some of the issues facing the industry for training workers are:

i. The existing confined space simulator is expensive and difficult to achieve.
ii. Existing simulators are difficult to install.
iii. Problems with suitability for use in training venues.

1.3 Problem Statement.

Based on the background of the problem studied, the first thing that is a problem for the industry today is the mobile confined space simulator that is available and is difficult to achieve based on the information found on the website that is confined space training container. The next one is difficult to install because the existing mobile confined space simulator is so large that it is difficult to carry anywhere. Also, the existing mobile confined space simulator is not suitable for use in the training area

due to its large size and is ready to be installed as some training areas require mobile confined space simulator which is required for installation.

1.4 Objective

The objective of this project is to create a confined space simulator:

i. Produces a confined space simulator of a size that meets the requirements set by NOSH GLOBAL.
ii. Easy to install confined space simulator.
iii. Easy to operate and install at training site.

1.5 Scope Project

The scope of this project is :

i. Able to operate maximum two workers in one session.
ii. Mobile confined space simulator suitable to operate three workers.

1.6 Significance of Project.

This project can be of great benefit to industry users such as NOSH GLOBAL. It is portable, easy to use and saves operation time. Besides, it can reduce the workforce in managing the project.

1.7 Conclusion

This project is of great benefit to the users of the confined space industry. It is portable, easy to use and can be installed without the need for a lot of energy. In addition to being able to train workers to perform confined space simulator training.

CHAPTER 2

LITERATURE REVIEWS

2.1 Introduction.

In this chapter, this topic have some research on and about all aspects of project for the production of the "Mobile Confined Space Simulator". Beside that, also found that several aspects need to be addressed so that the products are high quality and can decrease the cost to not exceed more than the budget that has been set.The rules for enclosed space entries fall into this category and only need to look at the statistics to understand why. In normal workplaces, for every 1400 accidents reported one results in death or serious injury. In a confined space, it's one in ten. Also, for everyone who died in a confined space, almost two people died trying to save. Many of them are professional rescue. In 1993 the United States became the first country to enforce a dedicated on a national scale. Since then many countries have followed it including Canada, Australia, New Zealand and Great Britain with other European countries soon. In the short run, the safety of workers in confined spaces has become a global issue, though it has been a problem for generations.

2.2 Study on Existing Projects.

A"confined space" is any chamber, tank, manhole, vat, silo, pit, pipe, flue or any other enclosed space, in which dangerous gases, vapor or fumes are liable to be present to such an extent as to involve risk of fire or explosion, or persons being overcome thereby, the supply of air is inadequate, or is likely to be reduced to be inadequate, for sustaining life or there is a risk of engulfment by material.

Generally, a confined space is a fully or partially enclosed space that:

I. Is not primarily designed or intended for continuous human occupancy.
II. Has a limited or restricted entrance or exit, or a configuration that can complicate first aid, rescue, evacuation, or other emergency response activities.
III. Can represent a risk for the health and safety of anyone who enters, due to one or more of the following factors:
    i. Its design, construction, location or atmosphere.
    ii. The materials or substances in it.
    iii. Work activities being carried out in it, or the.
    iv. Mechanical, process and safety hazards present.

Confined spaces can be below or above ground. Confined spaces can be found in almost any workplace. A confined space, despite its name, is not necessarily small. Examples of confined spaces include silos, vats, hoppers, utility vaults, tanks, water supply towers, sewers, pipes, access shafts, truck or rail tank cars, aircraft wings, boilers, manholes, pump stations, manure pits, and storage bins. Ditches and trenches may also be a confined space when access or egress is limited. Barges, shipping containers and fish holds are also considered as possible confined spaces.

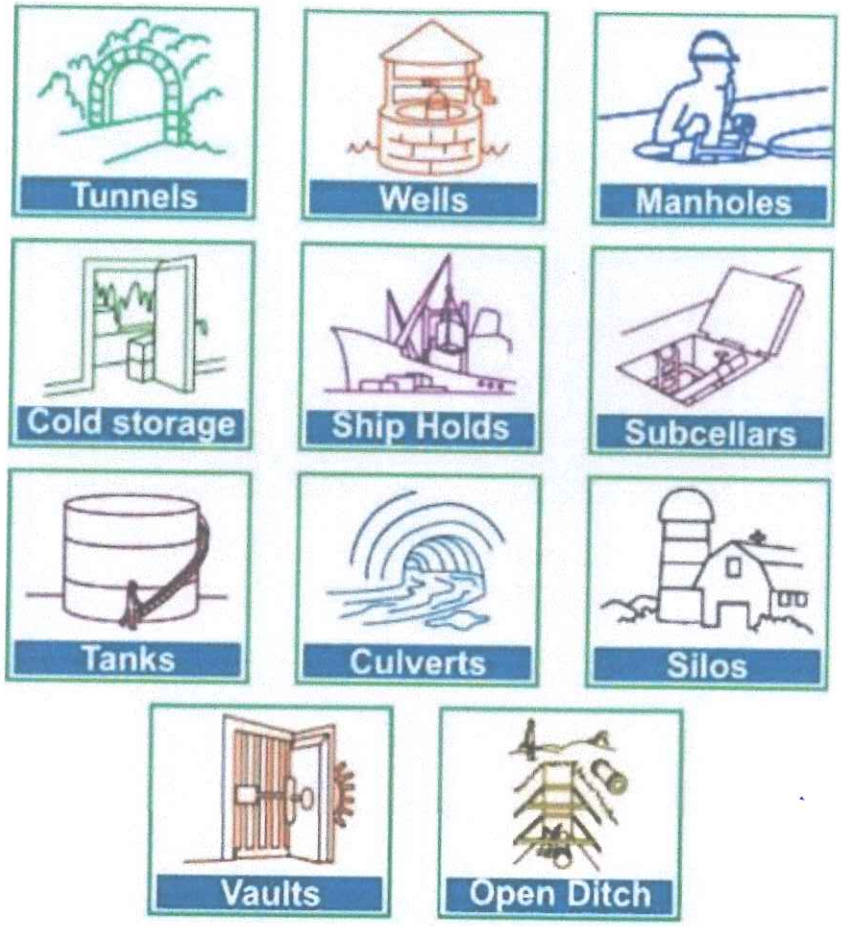

Figure 2.2.1. Examples confined space.

2.3 Comparison of Existing Confined Spaces

Table 2.3. Comparison of Existing Confined Spaces.

Type	Inter Modal Container	Pipe Line	Pressure vessel
Design	 Figure 2.3.1.	 Figure 2.3.2.	 Figure 2.3.3
Material	Stainless steel.	Rubber.	Steel.
Benefit	Can bring anywhere.	Light.	More like a real situation.

2.4 Study on design.

Based on the research that has been done, several drawing have been produced after making several studies and references on the internet and finding books that can help in selecting our project design. A design was selected which is similar to the design trailer but more flexible to operate.

2.5 Study on material.

Our group has done some research on materials to be used for the production of the project "confined space simulator". After doing some research, we find that it is easier to produce our project if all the components are using the same type of material. Additionally, we have selected a few ingredients to compare before selecting the best material to use. The materials that were compared are:

Table 2.5. comparison material

Material	Advantages	Disadvantages
Aluminium	i. Light ii. Have high resistance to erosion iii. Malleable iv. Easy to forge v. Easy to be machine	i. Too soft ii. Easy to absorb heat iii. Easy for electricity to flow through iv. Difficult to be welded v. Easily damaged
Stainless Steel	i. Difficult to be erode ii. Easily welded iii. Have high strength iv. Does not rust v. Resistance to heat	i. Difficult to do any job because it is very hard ii. Very expensive iii. Easy for electricity to flow through.
Copper	i. Malleable ii. Easy to forge iii. Light iv. Easy to work v. Durable	i. Expensive ii. Easy for electricity to flow through iii. Absorbs heat easily
Mild Steel	i. Durable ii. Resistance to heat iii. Malleable and can be forged easily iv. No corrosion v. Easy to weld	i. Weight ii. Expensive iii. Erosion can occur on it iv. Absorb heat easily

Iron	i. Durable ii. Resistance to heat iii. Malleable and can be forged easily iv. No corrosion v. Easy to weld	i. Weight ii. Expensive iii. Erosion can occur on it iv. Absorb heat easily
Chromium	i. Can be forged easily ii. Have high resistance to erosion iii. Strong and hard	i. Hard to work with ii. Electric current can flow through it easily iii. Absorbs heat quickly

CHAPTER 3

METHODOLOGY

3.1 Introduction.

In this chapter, there are processes involved in making the mobile confined space simulator. Besides, there are materials and components used in the construction of the mobile confined space simulator. Also, some drawings have been selected to serve as a guide to built the new mobile confined space simulator. Overall, the flow chart showing the manufacturing process is shown in figure 3.1.

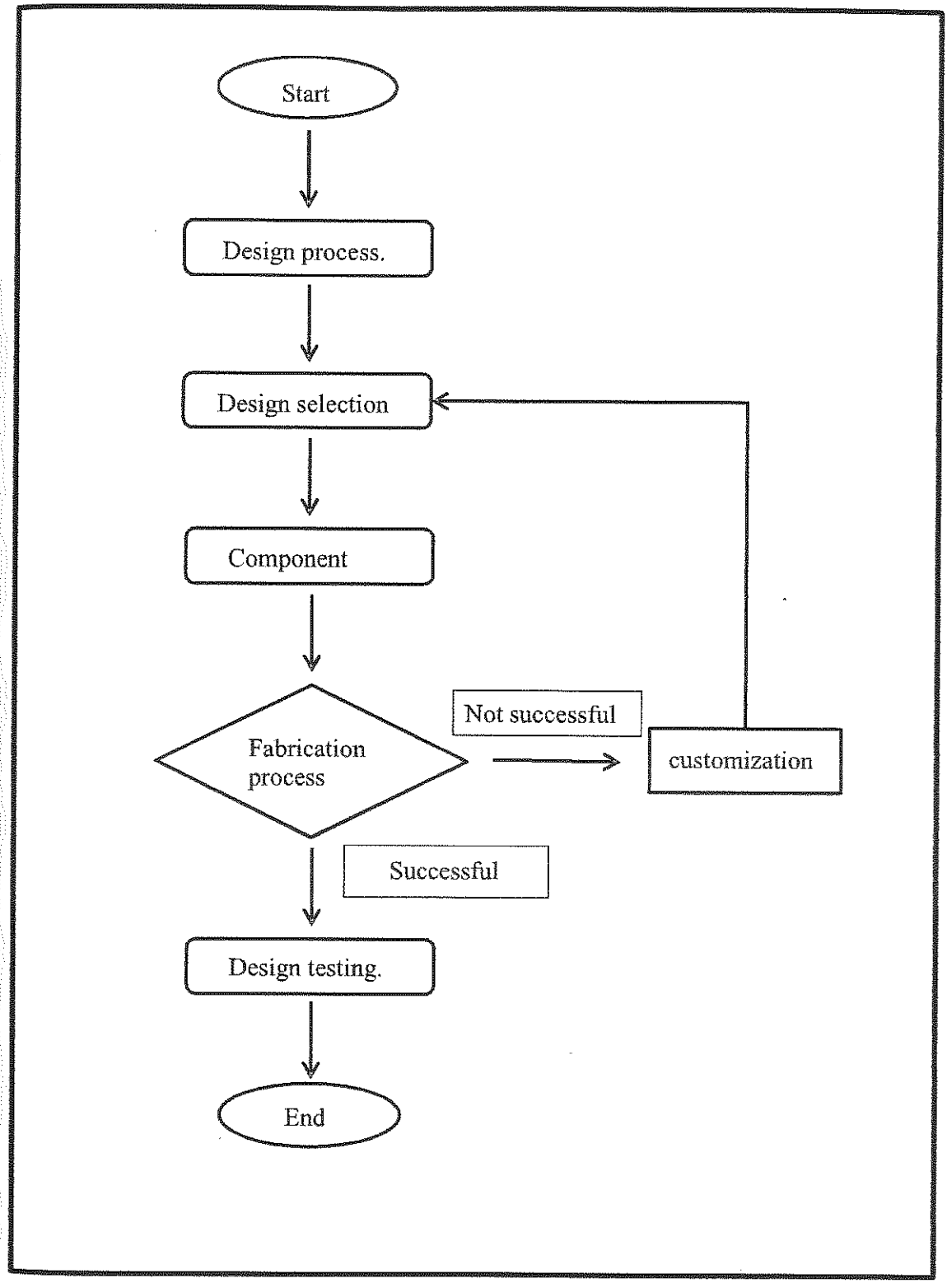

Figure 3.1.1 Automobile Confined Space Simulator Process Flow Chart.

3.2 Concept selection and design of confined space simulator.

Two confined space simulator designs have the potential to be built :

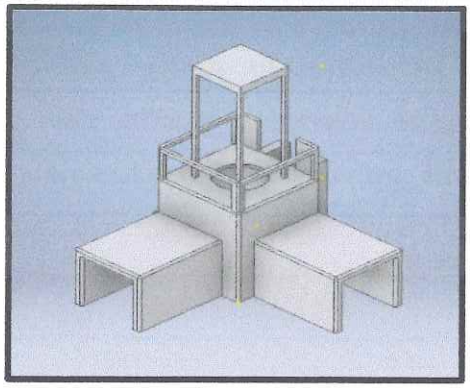

Figure 3.2.1. Design 1of mobile confined space simulator.

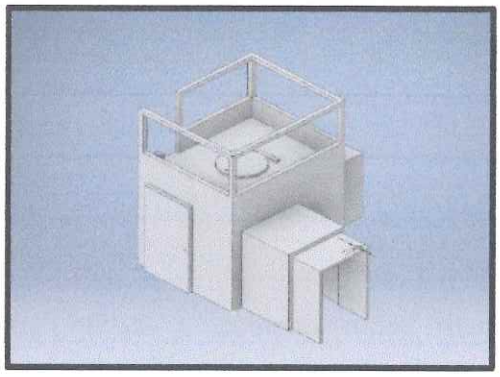

Figure 3.2.2 Design 2 of mobile confined space simulator.

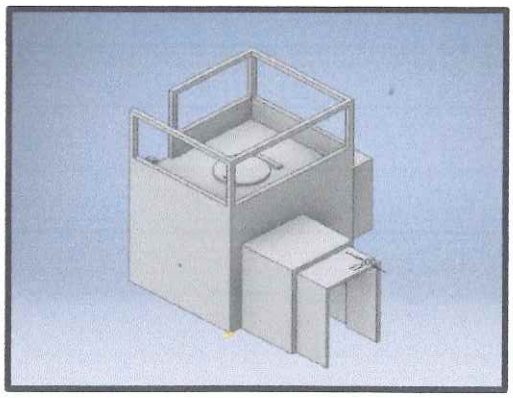

Figure 3.2.3 Design 3 of mobile confined space simulators.

Design 1 shows a drawing at the beginning that uses only two portable doors and has one step that can be taken out of the basic construction only. Additionally, emergency routes are open to facilitate rescue activities in the event of any emergency that requires the route.

Design 2 shows the drawing results of discussions with colleagues in the improvement. There are some differences between design 1 and design 2. In the second design, there are entry and exit points and there are two removable doorsteps. In addition, there are safety features in the area. The emergency lane has doors that can be closed and opened for the safety of users.

Design 3 is the result of a combination of design 1 and design 2 that have been improved by the supervisor. The size also meets the requirements of the relevant parties. mobile confined space simulator has entire and exits doors and there are two removable doorsteps.

3.3 Technical Painting.

Computer-aided design (CAD), computer-aided manufacturing (CAM) and microsoft inventor version 2007 is the use of computer technology to help design, process, optimize and especially draw (technical drawings and engineering drawings) of a piece or product. including the entire project design. The diagram below shows the technical drawing of the confined space simulator project.

I. The entire drawing of the project.

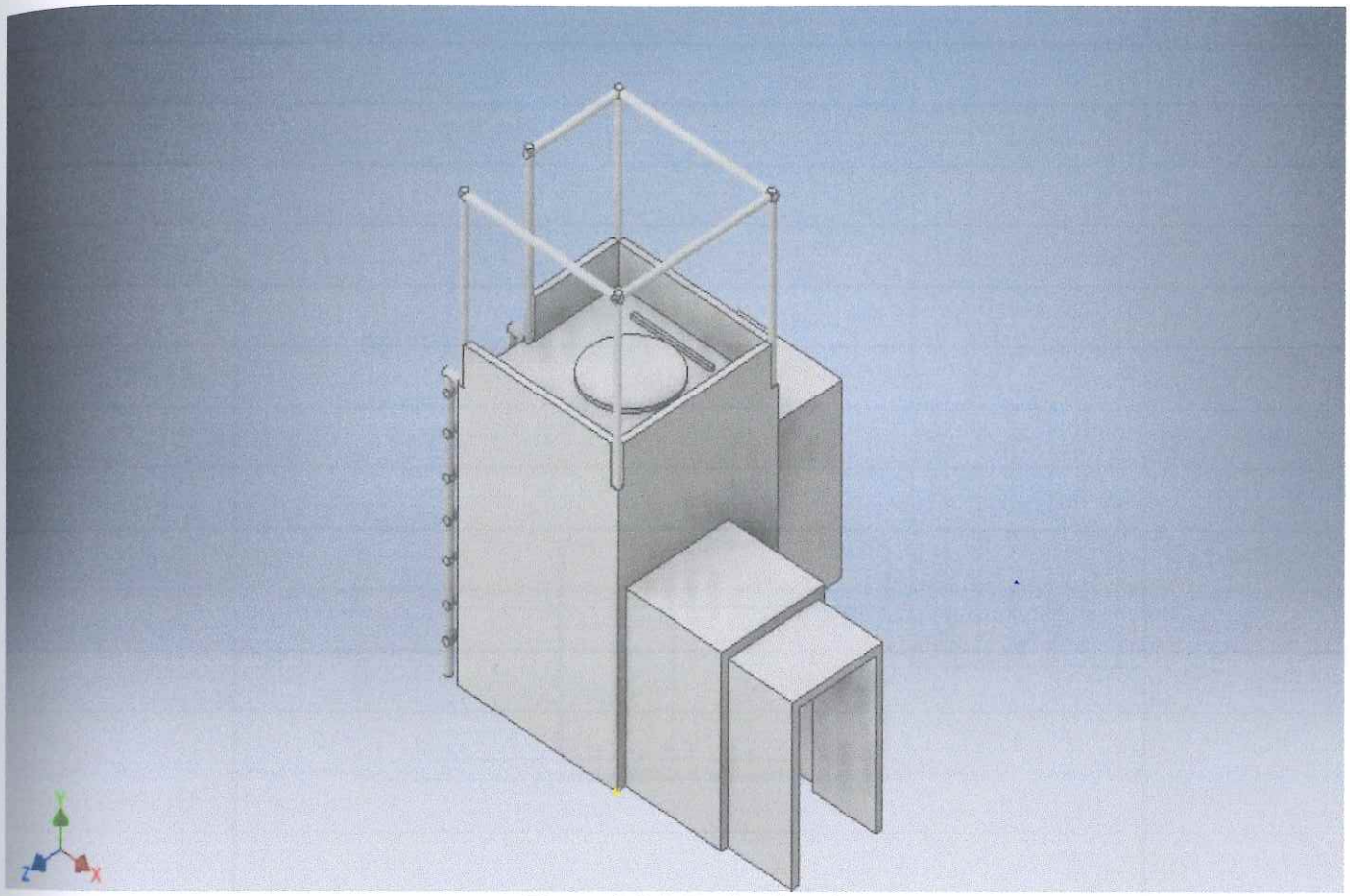

Figure 3.3.1. Entire drawing.

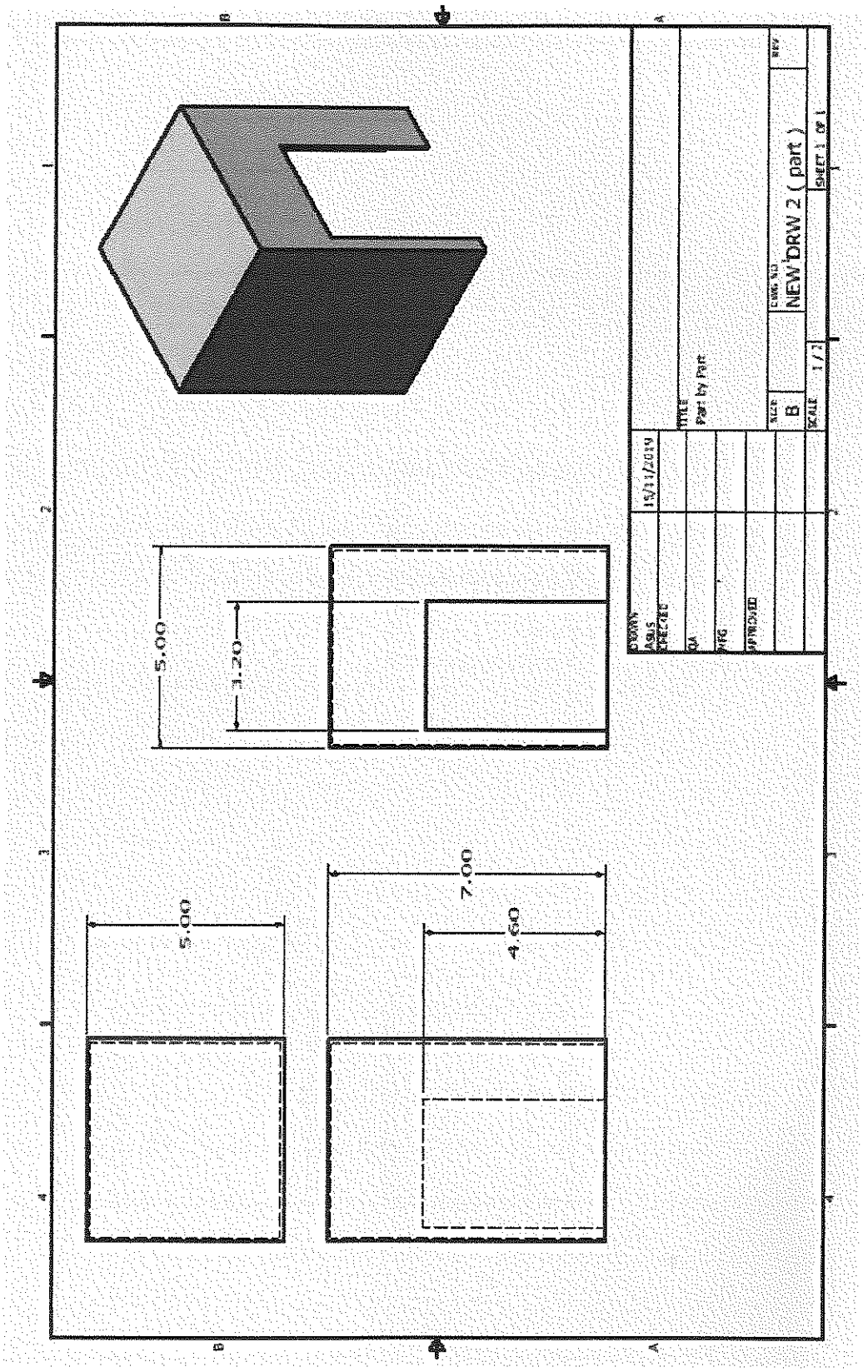

Figure 3.3.1.1. Part 1

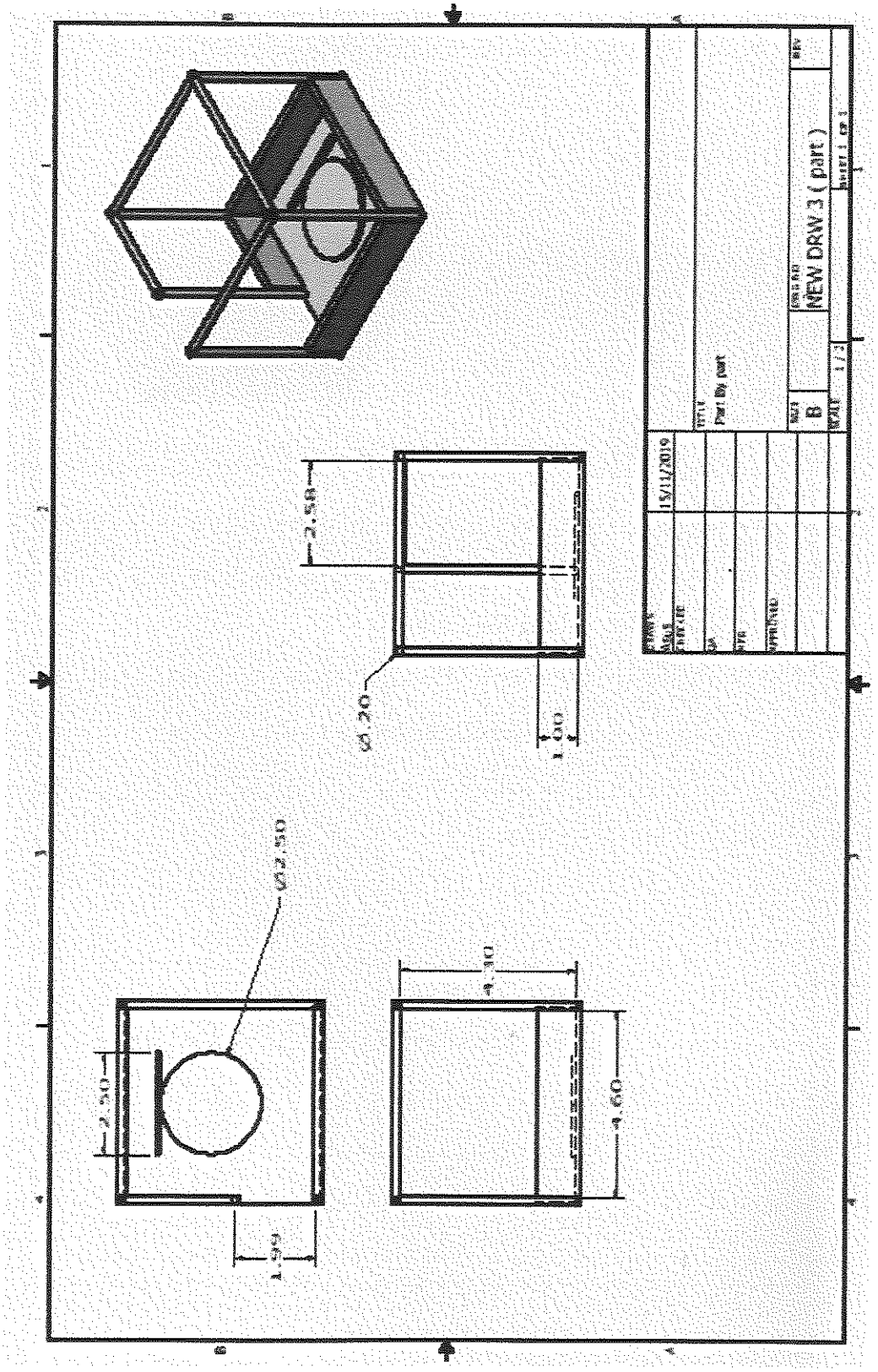

Figure 3.3.1.2. Part 2

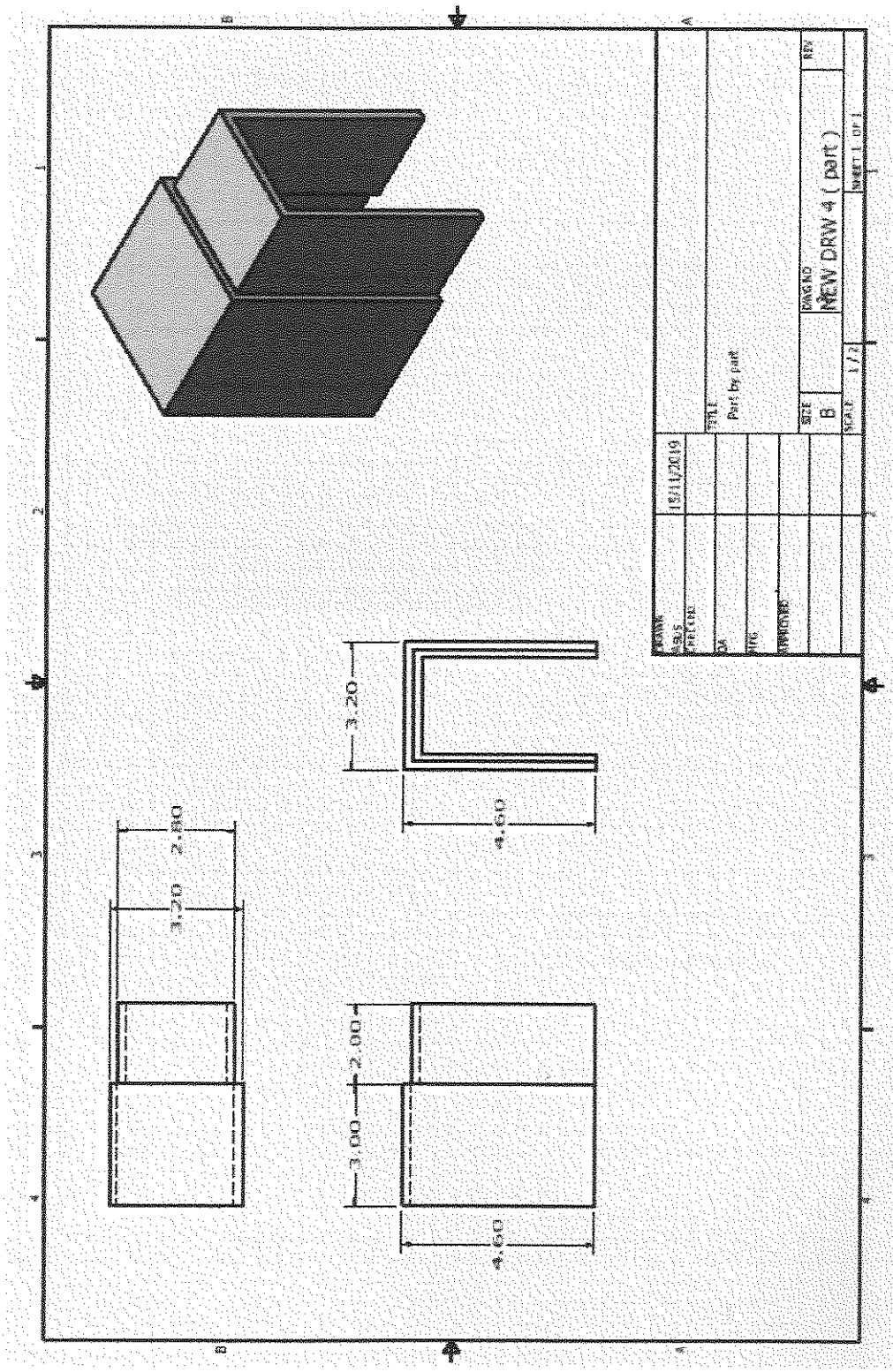

Figure 3.3.1.3. Part 3

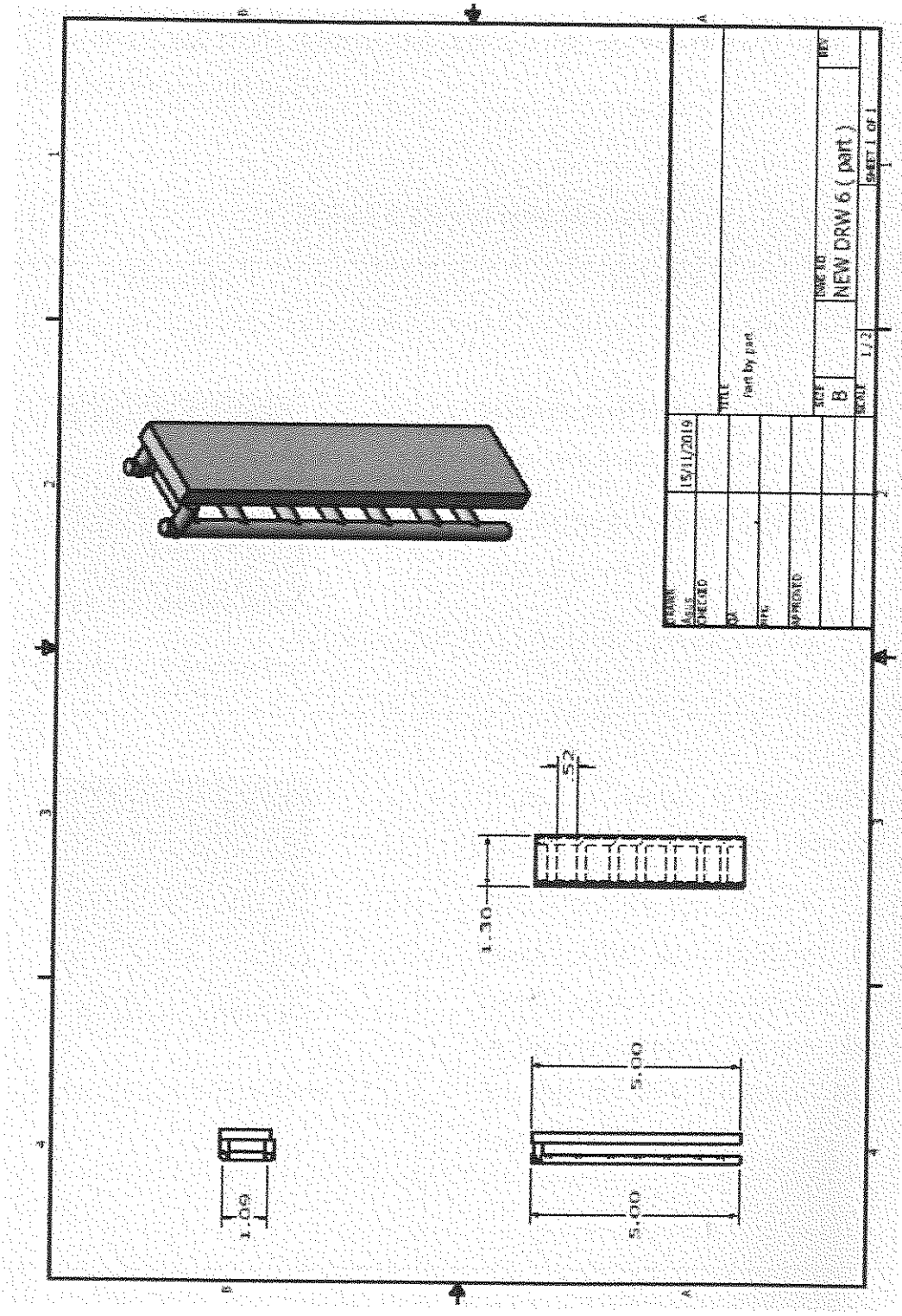

Figure 3.3.1.4. Part 4

3.4 Material selection and component.

The material selection process is crucial for controlling the expense of minimizing the cost of transportation. Material selection should follow the specifications required to avoid project failure. Tables 3.1 list of the material and table 3.2 list of components used to complete the confined space simulator project.

Table 3.1. Lists of materials used.

Materials.	Function.
 Figure 3.1.1 Square pipe.	i. Stainless steel is used in the confined space simulator framework. ii. It's corrosion-resistant, durable and very strong steel.
 Figure 3.1.2. Checker plate.	i. It has a raised surface, which provides an excellent anti-slip function. ii. Benefit from this advantage, the checker plate is commonly used in the factory, industry, and workshop for the anti-slip floorings, floor treads or platforms.