DEPARTMENT OF BUILDING

UNIVERSITI TEKNOLOGI MARA

(PERAK)

METHOD OF TEMPORARY STRUCTURES CONSTRUCTION

Prepared by:

MUHAMMAD AZIM BIN ZAIDEE

(2019238276)

DEPARTMENT OF BUILDING

FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING

UNIVERSITI TEKNOLOGI MARA

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FEBRUARY 2022

It is recommended that the report of this practical training provided

By

MUHAMMAD AZIM BIN ZAIDEE

2019238276

entitled

Method of Temporary Structure Construction

be accepted in partial fulfilment of requirement has for obtaining Diploma in Building.

Report Supervisor	:	_____ Dr. Suryani Binti Ahmad
Practical Training Coordinator	:	_____ Dr. Nor Asma Hafizah Binti Hadzaman
Programme Coordinator	:	_____ Dr. Dzulkarnaen Bin Ismail

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STUDENT'S DECLARATION

I hereby declare that this report is my own work, except for extract and summaries for which the original references started herein, prepared during a practical training session that I underwent at HIN Construction Sdn. Bhd. for duration of 20 weeks starting from 23rd August 2021 and ended on 7th January 2022. It is submitted as one of the prerequisite requirement of BGN310 and accepted as a partial fulfilment of the requirement for obtaining the Diploma in Building.

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Name : Muhammad Azim Bin Zaidee

UiTM ID No. : 2019238276

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Thank you.

ABSTRACT

When it comes to the building construction industry, temporary structures are a common thing to be use in construction and also being used for maintenance work. This report will cover about the method of temporary structures construction that been conducted at Ajinoriki (MSG) Malaysia Sdn Bhd factory which located at Lot 10460, Jalan Kilang, Pekan Bestari Jaya, 45600 Bestari Jaya. The aim of this report is to examine the progress of constructing the temporary structures from planning until the completion of the temporary structures. This report will also talk through the problems that occurred before constructing the temporary structures and how the solution was did to overcome the problems.

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CHAPTER 1.0

INTRODUCTION

1.1 Background of Study

Temporary works are frequently used in construction projects to offer access or protection to workers or the public, to protect a close by structures, or to support temporary loads during construction. Excavation support systems, underpinning, scaffolds, bracing and shoring, formwork, falsework, work platforms, decking, roof protection, and structures used in on-site contractor facilities are all examples of temporary works (Driscoll, Temporary Structures for Construction, 2020).Temporary works are often planned by or for the contractor who employs them, but they may also be developed for the project owner or another party in order to acquire permits, equalise contractor bids, or manage project risk. Even though a temporary structure is designed by a contractor, the project owner, design team, and other stakeholders may have a vested interest in its performance. This could entail creating performance criteria, analysing permanent work for construction staging, or reviewing the contractor's design (Driscoll, Temporary Structures for Construction, 2020).

Temporary structures are either disassembled and removed when permanent works become self-sufficient or completed, or they are included into the finished work. In addition, temporary structures are employed in inspection, repair, and maintenance activities (Robert, 2020).

Scaffold, in building construction, a temporary platform used to elevate and support workers and materials during the construction, repair, or cleaning of a structure or machine; it consists of one or more planks of convenient size and length, with various methods of support, depending on the form and use; it consists of one or more planks of convenient size and length, with various methods of support, depending on the form and use. On most construction projects, steel or aluminium tubular scaffolding has essentially replaced timber scaffolding. Tubular scaffolding may be built in any shape, length, or height with ease. To produce a very movable staging, sections can be mounted on casters. For weather protection, the scaffolding might be covered with canvas or plastic sheeting. Tubular hoisting towers can

be rapidly erected with standard connections from steel tubes or pipes with a diameter of 3 inches (Britannica, 2014)

A timber frame produced and erected on site provides support for the planks in timber scaffolding. Vertical posts, horizontal longitudinal members known as ledgers, transverse members supported by the ledgers, and longitudinal and transverse cross-bracing may make up the frame. The transverse members support the planks (Britannica, 2014) .

Trestle supports are utilised for large-area operations where little or no height change is necessary. The trestles could be of a unique design or simple carpenter-style wooden sawhorses. Trestles with special designs can be altered to work at heights ranging from 7 to 18 feet. A suspended scaffold is made up of two horizontal putlogs, which are small timbers that support the scaffold's flooring and are each connected to a drum mechanism. Each drum is connected to an outrigger beam fastened to the structure frame overhead via cables. The putlogs between which spanning planks form the working surface can be raised or lowered using ratchet devices on the drums. A worker on the scaffold can raise or lower power scaffolding with the help of an electric motor. (Britannica, 2014).

Temporary buildings are created to support the work crew and materials during construction, maintenance, or repair work. Scaffolding is the term for these temporary structures. Scaffolding is commonly utilised in many types of building projects and assists with access at heights. This ephemeral structure serves as a platform for the working class to carry out its construction operations. Scaffolding is designed to comply with safety rules because it requires work at a height. According to surveys, scaffolding is directly or indirectly responsible for a large percentage of construction-related incidents. As a result, the scaffolding contractor and scaffolding employees should exercise extreme caution when performing their jobs. Scaffolding should be made of high-quality materials (Deyin, 2019)

Temporary structures are also utilised to help with the construction of buildings, bridges, tunnels, and other above- and below-ground facilities by providing access, support, and protection for the facility being built, as well as ensuring the safety of employees and the general public. When the permanent works become self-supporting or completed, temporary structures are either destroyed and removed, or they are incorporated into the finished work. In addition to inspection, repair, and maintenance operations, temporary buildings are used (Ratay, 2020)

1.2 Objectives

1. To identify the construction method of temporary structures.
2. To identify the estimate time to construct the temporary structure
3. To determine the problem and solution of temporary structure.

1.3 Scope of study

The study is carried at Aji No Riki's factory which located at Kuala Selangor, Selangor. The project started on 2nd September 2021 and the end of the project was to be expected on 13th September 2021. This study is focusing on how the temporary structures works and how it is constructed at site. The material that included in these structures are hollow steel, scaffolding, U-head jack base and the machineries that used in constructing the temporary structures are grinder and stick welder. However, this study will also the advantage of using the temporary structure. The manpower that being used to construct the temporary structure in this case study is around 3-5 labours in total. For more explanation about the temporary structure construction method will be written and explain below.

1.4 Methods of Study

Method of study that being used was three methods which being stated below:

1. Observation

The observation is being use as a study method to collect data by observing the labours construct the temporary structures. The observation took around 12 days including the setting up of the temporary structure and the dismantling process.

2. Interview

The interview is one of the methods that been used to gain data and information on what is happening at site about the project. The interview was carried out with the contractor and the labours that working on the temporary structures at site. It was conducted around 10 minutes to interview them. All of the information from the interview being written down on notebook.

3. Document review

Document review also been used to collect information about the project. Document review from, building plan, progress report and Standard Operation Procedure to receive data. Building plan helps to see on where the temporary structure should be construct with more detail. Progress report also being check everyday to make sure everything in control at site.

CHAPTER 2.0

COMPANY BACKGROUND

2.1 Introduction of Company

HIN Construction, now known as HIN Group (Hin Construction Sdn Bhd), is a renowned Malaysian construction business that offers turnkey solutions for residential, commercial, and industrial projects. HIN Group began as a modest one-man handyman team in 1968 and now has three companies that focus on residential and commercial building maintenance, industrial construction and restoration, and the selling of building supplies such as cotton wall painting. Under the big-name HIN Group, there is other 3 groups with different specialist, the first one is KIM SOON SPECIALIST, focusing on residential and commercial service maintenance such as air conditioning servicing, plumbing work and electrical works. The second one is WARISAN ZEMERLANG, which prioritise on plumbing and waterproofing work, this group also take spot in industrial, commercial and residential piping project. The last one is 5 COLOUR SOLUTION, which is handling building materials marketing. This group manufactures, imports and also distributes world class building materials and technologies in South East Asia. The story of this company also being established in CNN WORLD interview. Furthermore, the story about this company uses ex-prisoners that are under parole as labours also being featured in The Rakyat Newspaper. Other than that, this company also consist many high-skilled and experienced labours in the fields that can do wiring and electricity works, bricklaying work, and any other construction works.

2.2 Company Profile

HIN Construction Sdn. Bhd. is a company that been organize and operating since 1968, and now currently vigorous in residential, commercial, and industrial construction projects. This company now lead by a person name Seow Kent Vont. HIN Group began as a small one-man handyman team in 1968 and has now grown to include three firms that specialise in residential and commercial building maintenance, industrial construction and restoration, and building supply sales. This company based in Selangor located at No.33, Jalan 1/5, Seksyen 1, Bandar Teknologi Kajang, 43500, Selangor.

Figure 2.1 shown the location of the company office on Google Maps

The mission of this company is to provide quality construction, technical and management services to the clients. The company will strive to implement a long-term relationship with the clients, based on safety, quality, timely service and an anticipation of what the clients needs. To fulfil the mission, this company treat all of the employees fairly and involve the workers in the quality improvement process to insure responsiveness and cost effective work execution.

2.3 HIN Construction Sdn. Bhd. Organization Chart

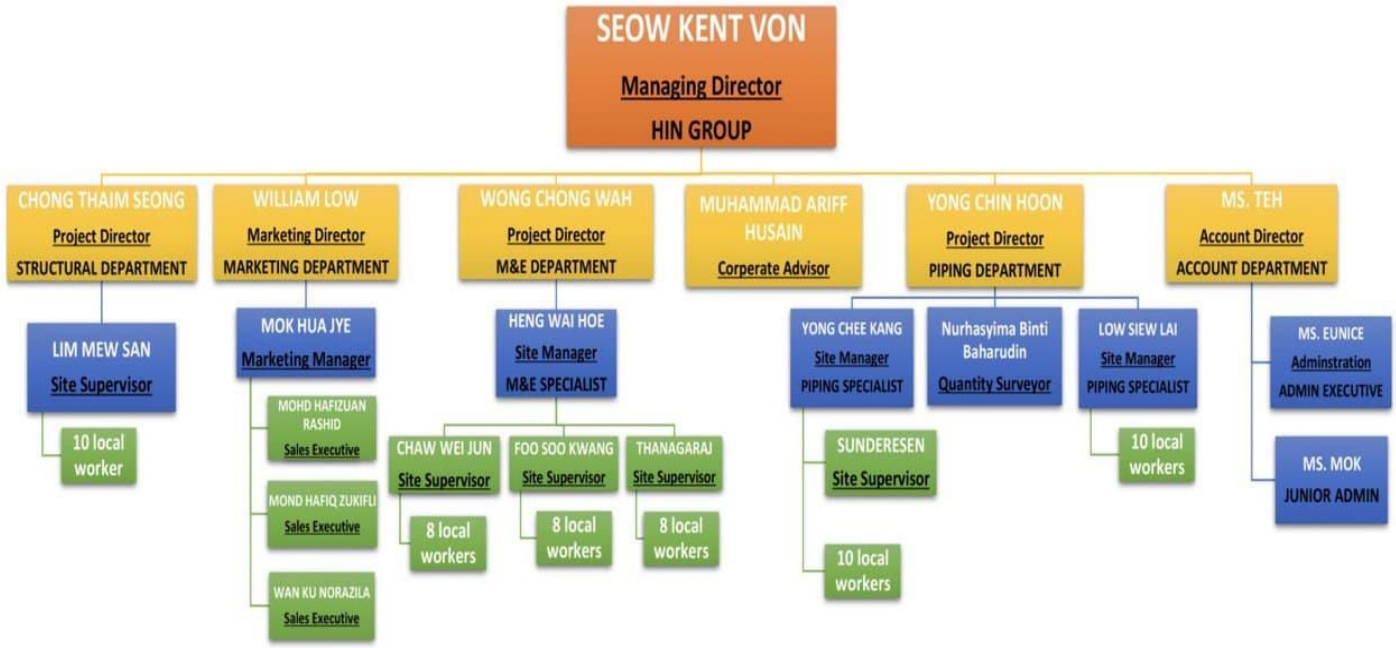

Table 2.1 shown the table of organization chart from HIN Construction

2.4 List of Project

2.4.1 Completed projects

No.	Project Title	Project Value	Start Date	Completion Date	Project Duration	Client
1.	Renovation project for 1 unit bungalow at No. 29, Jalan 4/52C, Petaling Jaya, Selangor Darul Ehsan.	RM 66,000	19/10/2020	02/01/2021	4 Months	Mdm. Maria
2.	Renovation project for at No. 6, Jalan Jasmin 16/C, Taman Jasmin 2, 43000 Kajang Selangor	RM 4,600	20/10/20	20/10/20	1 day	Ms. Tham Kuan Heong
3.	Renovation project at No. 204, Jalan 2/4, Taman Ehsan Kepong, Kuala Lumpur	RM4,300	05/10/2020	16/10/2020	11 days	Bong Yoke Kian
4.	Renovation project at No. 15 Jalan HP 2/2, HillPark 1, Selangor Darul Ehsan.	RM45,00	23/07/20	30/09/20	2 months	Yuans F&B Sdn Bhd

5.	construction project at Lot 10460, Jalan Kilang, Pekan Bestari Jaya, 45600 Bestari Jaya, Selangor, Malaysia.	RM34,960	19/10/20	18/11/20	1 month	Ajinoriki MSG (Malaysia) Sdn Bhd

Table 2.2 Shown the table of completed projects

2.4.2 Ongoing projects

No.	Project Title	Project Value	Start Date	Completion Date	Project Duration	Client
1.	Plumbing work at PT. 1558, Kawasan Perindustrian Kajang Jaya, 43500 Semenyih, Selangor, Darul Ehsan.	RM 300	01/12/2021	In progress	-	Wansern Technology Sdn Bhd
2.	Renovation project for at No. 5, Lot 2388, Jalan Batu Bata, Bukit Kemuning, 42450 Shah Alam, Selangor Darul Ehsan.	RM 476,000	09/10/21	08/02/22	4 months	KST Glass & Aluminium Sdn Bhd

3.	Renovation project at No. 32, Jalan Teknologi 3/3A, Taman Sains Selangor 1, Kota Damansara, PJU 5, 47810 Petaling Jaya, Selangor.	RM 29,769	02/01/2022	15/01/2022	13 days	SJEE Engineering Sdn. Bhd.
4.	Renovation project at No. 68, 68-1 & 68-2, Jalan Tasik Utama 7 Medan Niaga Tasik Damai, The Trillium Lake Field, Sungai Besi, 57000 Kuala Lumpur.	RM42,00	05/12/2021	18/02/22	2 months	Kejuruteraan Segar Sdn Bhd
5.	Partition wall construction work at Lot 10460, Jalan Kilang, Pekan Bestari Jaya, 45600 Bestari Jaya, Selangor, Malaysia. .	RM 18,436	12/12/2021	18/01/2022	1 month	Ajinoriki MSG (Malaysia) Sdn Bhd

Table 2.3 Shown the table of ongoing projects

CHAPTER 3.0

CASE STUDY (CONSTRUCTION OF TEMPORARY STRUCTURES)

3.1 INTRODUCTION

This case study is about the construction of the temporary structures. The duration to complete this structure takes 2 days, from 3rd September 2021 until 4th September 2021. The location of this project is at Aji No Riki, Kuala Selangor. The purpose of this temporary structure is for skimming work inside the factory, the place that need skimming work done don't have so much access for the workers to their works so the temporary structure in this project is surely needed to make the skim and paint job done easily. The material that needed in this project for temporary structures are hollow steel, plywood, canvas and scaffolding. Other than that, the tools that been used to complete the construction of this temporary structures are stick welder and grinder.

The purpose of constructing the temporary structures is because that the height for the skim job to be done is unreachable by a person, so temporary structures is very important in this project. Labours cannot set up the scaffolding straight away because there is water tank on that area, so the water tank will be an obstacle to setting up the scaffolding. So before construct the scaffolding, hollow steel needs to be welded above the water tank. Hollow steel being welded on that area at floor above the water tank, from floor to beam above the water tank. It is a risky job to carry out the welding work above the water tank but the workers following all of the SOP and carried out the welding work smoothly without any unwanted incident at site. After all the hollow steel was done welded and being checked whether the welding work is good or not, 12mm plywood being lay on top of the hollow steel to act as platform for the scaffolding to be on top of it. Figure below will show the drawing plan of the factory.

To make sure the dust and dirt stay away from the water tank below the platform, labours covering every part of the platform with canvas then the canvas being nail to the wall so the canvas stay in the same place, if the canvas not being nail to the wall, it will make the surface of the platform became unsafe to step on and can cause slippery surface which can lead to injury during work on progress. After the labours done nailing the canvas to the wall, workers start to bring the all of the scaffolding component to the platform area to setting up the scaffolding as needed for the skim work on that area.

Workers start with the jack base and then was followed up with scaffolding frame. To lock both of the frame together cross brace was used to lock the frame and make sure the scaffolding stand still. Scaffolding stairs used because there is like 4 level of scaffolding that needed to reach certain heights. Because of the height of this scaffolding, scaffold tubes and clamps being used to work as tying all of the scaffolding together and can increase the stability of the scaffolding so it will be a lot safer for workers to walk on it. Labours continue to setting up the other scaffolding on that area. The location of the site and drawing plan will be shown on the figure down below.

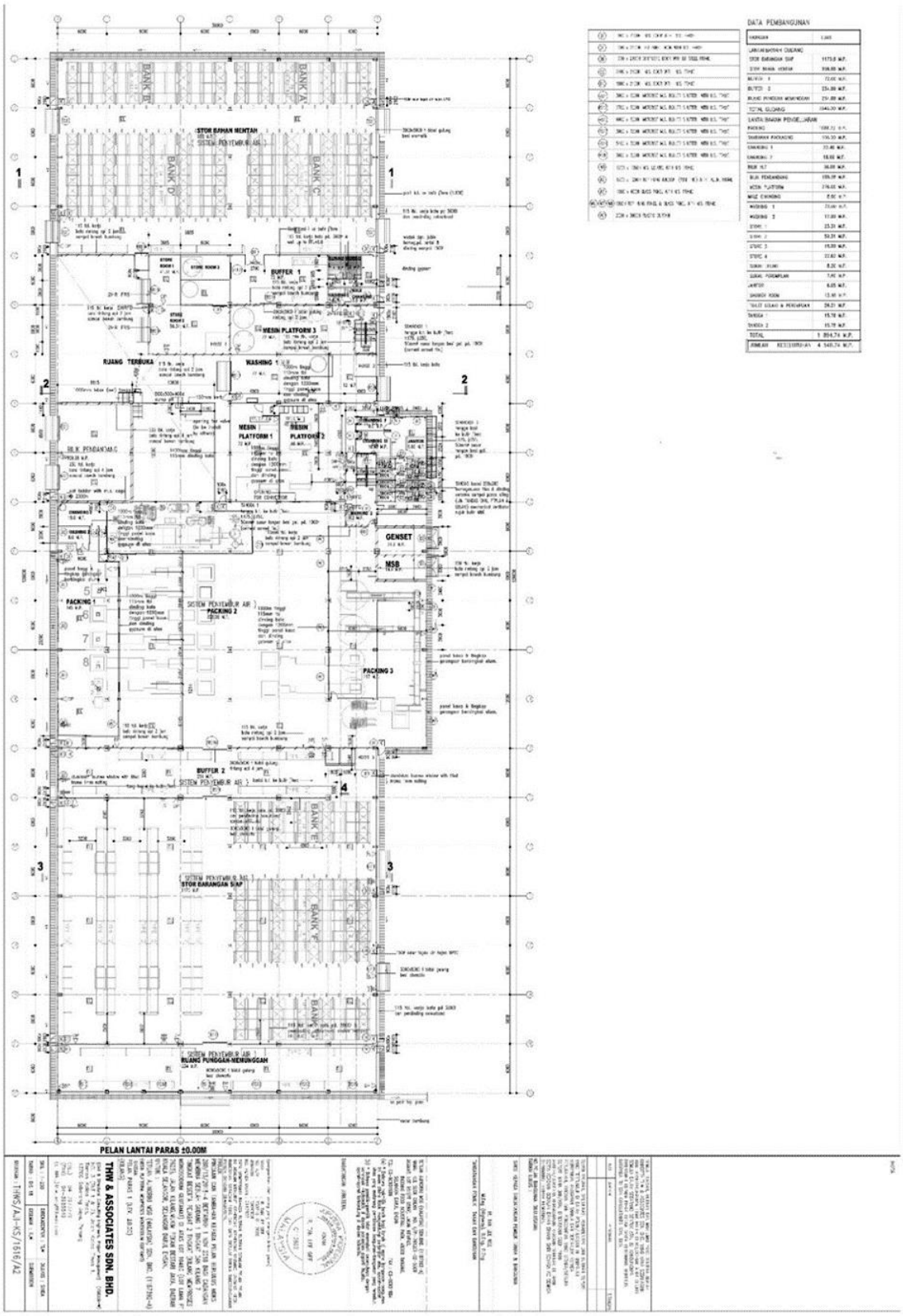

Figure 3.1 shown the floor plan of the factory

Figure 3.2 shown the location of the site on Google Maps

3.2 Method of Temporary Structures construction

i. Plan out the temporary structures

Planning out the place that need the temporary structures by visiting the area and plan review to check the structure around that area before setting up the temporary structures. By plan out before setting up the temporary structures, all possible method can be seen to ensure safety and convenient work place for the skim work.

Figure 3.3 shown the area that need temporary structures

ii. Preparing The Materials for Temporary Structures

All of the scaffolding component, plywood and hollow steel being lift up by crane on the roof to make the works a lot easier for the labours because the construction took place on the 3rd floor of the factory, so the labours doesn't need to bring all of the scaffolding to the 3rd floor by their self.

Figure 3.4 shown the component of scaffolding

Figure 3.5 shown the 12mm plywood

Figure 3.6 shown the hollow steel

iii. Setting Up Hollow Steel

Labours then setting up the hollow steel from slab to on top of the beam above the water tank. After the hollow steel been placed in the exact spot, labours start welding the hollow steel together to create a lot stronger structure to act as a support for the platform before the scaffolding being set up. The total of hollow steel been used for these temporary structures is 13 hollow steels. All of the hollow steel set up can be seen as figure down below.

Figure 3.7 shown the labours setting up the hollow steel in position

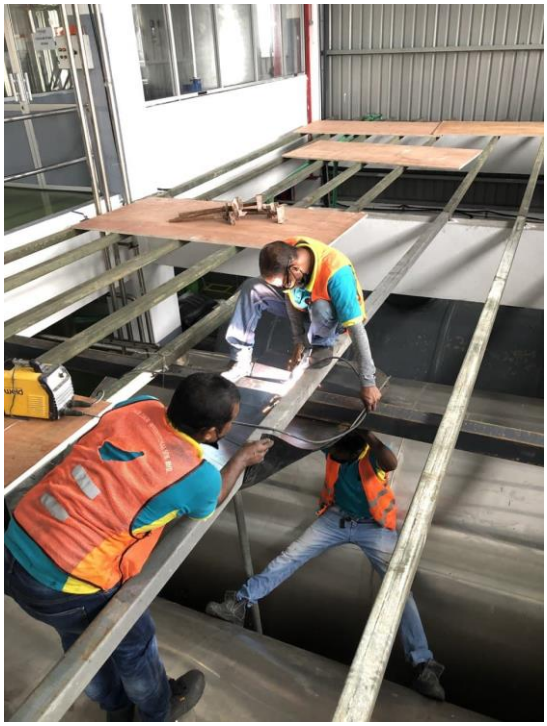

Figure 3.8 shown the labours welding the hollow steel

Figure 3.9 shown the hollow steel that been welded to the beam

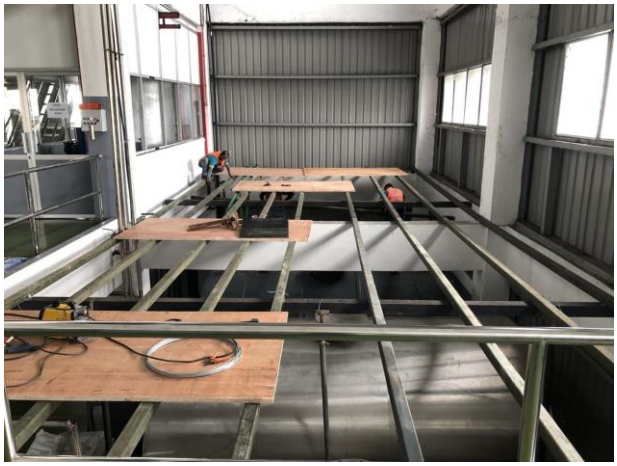

Figure 3.10 shown the hollow steel temporary structure for the platform

Figure 3.11 shown the hollow steel that been welded

iv. Plywood and Canvas for The Temporary Structures

Next, after all the hollow steel was done setup by the labours, the workers then carry all the 12mm plywood to lay it on top of the hollow steel to act as a platform for the scaffolding to be on top of it. Labours then laying the canvas to cover up the surface of the platform to make sure all the dirt and dust stay away from below the platform. The side of the canvas being nailed to the wall so the canvas stays where it should be and doesn't move during work in progress that maybe can cause some injury to the workers that do the skim and paint work on that area.

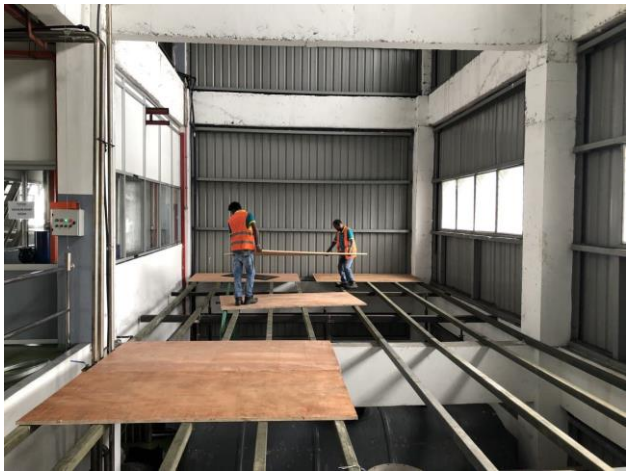

Figure 3.12 shown the labours laying the plywood on top of the hollow steel structure

Figure 3.13 shown the labours laying the plywood on top of the hollow steel structure

Figure 3.14 shown the labours nailing the canvas to the wall

Figure 3.15 shown the canvas that been nailed to the wall

Figure 3.16 shown tidy up the canvas on the plywood

Figure 3.17 the canvas has done being installed

v. Setting Up Scaffolding

After all of the work for the platform is done, now the scaffolding can be set up because of the flat surfaces that provided by the temporary structures of the platform. The frame of the scaffolding being insert in the base plate for stability, and then being lock with cross brace so the scaffolding can stand up safely. To make sure the scaffolding a lot stable, the workers also installing the scaffold tubes alongside the frame of the scaffolding from frame to frame. Then the scaffold tubes being clamp to the frame. This will improve the strength and stability for the scaffolding temporary structures. The labours then repeat the same step for the rest of scaffolding setup with adding up staircase because these temporary structures require 4 level of scaffolding to reach the requirement for the paint and skim work in that area.

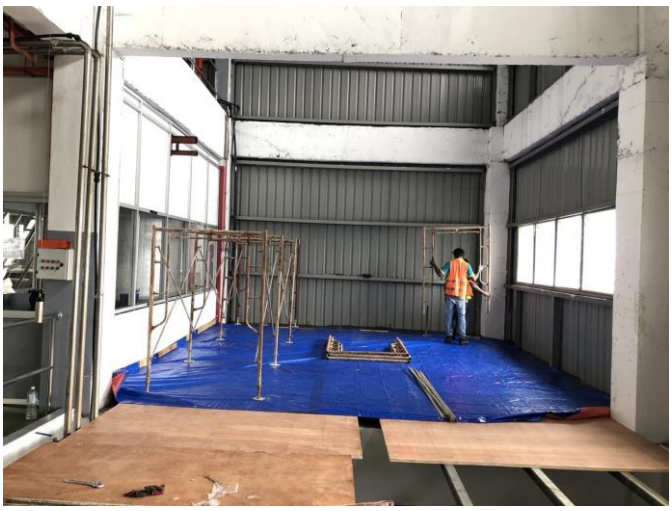

Figure 3.18 shown labours start setting up the scaffolding

Figure 3.19 shown labours start setting up the scaffolding

Figure 3.20 shown the labours clamp the scaffold tube to the frame

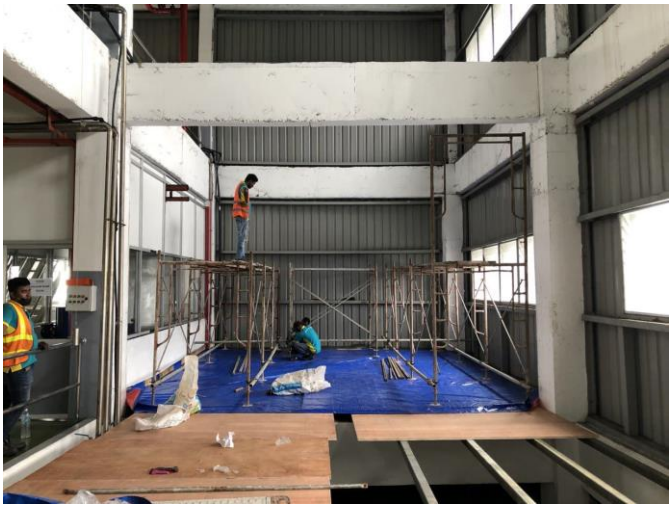

Figure 3.21 shown the first level of scaffolding is done

Figure 3.22 shown the labours continue to the next level

Figure 3.23 shown the complete temporary structure(scaffolding)

3.3 Machineries and Tools for Temporary Structures Construction

There are several machines and tools that needed to complete the construction of temporary structures.

3.3.1 Machineries

i. Welding inverter

The welding inverter is a voltage regulating electrical system. In the case of a welding equipment with an inverter, the AC power supply is converted into a lower usable output voltage. Inverter-based devices use a series of electronic components to convert the power - in contrast to conventional transformer-based devices which depend primarily on a single large transformer to regulate the voltage. An inverter works by increasing the frequency of the primary power supply from 50Hz up to 20,000 – 100,000Hz (Weldclass, 2013).

Figure 3.24 shown the welding inverter

ii. Grinder

The grinder being used to cut down the hollow steel following the requirement for the plan of temporary structures construction.

Figure 3.25 shown the grinder

3.3.2 Tools

i. Hammer

The goal of using hammer after weld the steel is to remove slag that has accumulated on the surface of the welded workpiece while also maintaining the smooth surface of the weldment.

Figure 3.26 shown the hammer

3.4 Problems and Solutions in Constructing Temporary Structures

There is one problem to construct the temporary structure(scaffolding) on the area that needed scaffolding. The problem and solution will be written and elaborate down below.

1. The surface of that area is full of water tank.

   The problem about the area that need temporary structure for this project is, the surface of that area is full of water tank. It is impossible to construct the temporary structures of scaffolding in that area. Above the water tank, there is no slab until the top floor just void in that area. Furthermore, there is zero spot for the base plate of scaffolding being place due to limited space in that area. The wall, beam and column in that area need to be skim and paint but it is unreachable by person due to the height of each floor. Scaffolding is the only option for temporary structures to be build in that area so the paint and skim work can be done.

   After reviewing the plan and site visit, to solve this problem, the site engineer that in charge for that site decide to place the hollow steel and plywood on the beam in that void area of the building, and then placed plywood on top of the hollow steel to create a platform so the scaffolding can be set up.

CHAPTER 4.0

CONCLUSION

The conclusion that can be made of this report is about the temporary structures that need to be build for skim and paint work to be done at Ajinoriki (MSG) Malaysia Sdn Bhd factory which located at Lot 10460, Jalan Kilang, Pekan Bestari Jaya, 45600 Bestari Jaya, Selangor, Malaysia. The aim of this study is to acknowledge the process of constructing the temporary structures. The purpose of this temporary structure is for skimming work inside the factory, the place that need skimming work done don't have so much access for the workers to their works so the temporary structure in this project is surely needed to make the skim and paint job done easily. The purpose of constructing the temporary structures is because that the height for the skim job to be done is unreachable by a person, so temporary structures is very important in this project. Hollow steel being welded on that area at floor above the water tank, from floor to beam above the water tank. It can be concluded that during any construction work there will be problem, and each of that problem that occurred on site should have a solution.

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