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ON THE JOB TRAINING REPORT AIRPORT ELECTRICAL ENGINEERING STUDY PROGRAM DIPLOMA PROGRAM THREE CLASS XX AT SULTAN MAHMUD BADARUDDIN II AIRPORT PALEMBANG

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Abstract

On The Job Training (OJT) which is carried out at the airport is a work training program designed to provide practical experience to cadets in applying the theories they have learned during their education at the Medan Aviation Polytechnic. Sultan Mahmud Badaruddin II Airport Palembang has various electrical load needs that vary in each of its buildings, including terminals and several office units. The main source of electricity for this airport comes from PLN, solar panels (solar cells), and diesel generators as emergency power sources. After carrying out On The Job Training (OJT) activities at Sultan Mahmud Badaruddin II Airport Palembang, I draw the following conclusions about the implementation of OJT: Keep equipment in optimal condition with maintenance and repairs carried out daily, weekly, monthly, and annually in the electrical unit according to the predetermined schedule. During the implementation of On The Job Training, cadets can find out about activities and problems that occur at Sultan Mahmud Badaruddin II Airport Palembang. Gaining experience, learning, kinship and responsibility during OJT activities leaves a good impression on cadets Cadets can apply the theory they get during their education and then compare it with conditions in the field. In doing work or repairs, they do not do it alone because technicians are a team that helps each other.

Keywords: *On The Job Training, Electrical Engineering, Sultan Mahmud Badaruddin Ii Airport Palembang*

INTRODUCTION

Fuel oil is a type of fuel that is commonly used in various places, from vehicles, small engines to large engines. The process of its use generally involves combustion, where the fuel reacts with oxygen and produces heat. In a system, fuel is usually stored in a special container known as a fuel tank. The fuel tank functions as a place to store flammable liquids. Although all fuel storage containers can be called fuel tanks, the term is more often used to refer to the part of the engine system that stores and distributes fuel to the engine. Fuel tanks

are available in various sizes and materials, from small plastic to large steel used in large engines such as aircraft and power plants (Keskin, Salman, & Koseoglu, 2022).

On The Job Training (OJT) conducted at the airport is a work training program designed to provide practical experience to cadets in applying the theories they have learned during their education at the Medan Aviation Polytechnic. This activity aims to train cadets to be able to face real challenges in the world of work, especially in the field of Airport Electrical Engineering (Wandelt & Wang, 2024). Through OJT, cadets have the opportunity to learn, understand, and be directly involved in maintaining the electrical system at the airport, including power plants, distribution networks, runway lighting systems, and other electrical aspects that support airport operations (Khalef & El-adaway, 2021).

Sultan Mahmud Badaruddin II Airport Palembang has various electrical load needs that vary in each of its buildings, including terminals and several office units. The main source of electricity for this airport comes from PLN, solar panels (solar cells), and diesel generators as emergency power sources (Pasandín & Pérez, 2021). Unpredictable power outages with a relatively long duration require the airport to have a backup power source. For this reason, generator sets (gensets) are used as supporting facilities. A generator with a capacity of 1000 KVA is vital equipment that must be maintained and serviced regularly to continue to function optimally. Frequent power outages make generators as backup power supplies often operated. Thus, the use of diesel is increasing and diesel refueling is also carried out more often (Mehrizi-Sani, Liu, Schanen, & Hadjsaid, 2024).

The availability of fuel in the tanks at Sultan Mahmud Badaruddin II Airport is very important because it acts as the main source of energy (Room, 2021). Therefore, monitoring of fuel tanks needs to be carried out periodically to ensure that the supply is maintained. This monitoring is still carried out manually by using a hose to measure the height of the liquid in the tank (Hou, Bose, Marla, & Haran, 2024). This makes it possible for diesel to spill from the reserve tank to the main tank of the generator when it is too full. In addition, monitoring in this way does not allow continuous monitoring of fuel, making it less efficient in maintaining fuel availability (Khalef & El-adaway, 2023a).

Based on the problems that occurred, to ensure that the generator can run smoothly without worrying about the fuel in the tank running out and not overfilling the diesel, the author made a report entitled "Design and Construction of a Fuel Volume Monitoring System in a Generator Tank at Sultan Mahmud Badaruddin II Airport, Palembang" (Horton et al., 2025).

METHODS

On January 1, 1920, due to some circumstances, the concession for the plantation land was transferred to Palembang Maatschappij (Palembang MIJ) or NV Palembang Maskapai. That year, there was news that the Dutch aviation pioneer led by Jan Pieterszoon Coen would fly his small Fokker plane from Europe to the Dutch East Indies in 20 hours of flight. So Palembang MIJ, which held the concession for the land, provided a plot of land to be handed over as the first airport in Palembang City. Therefore, in 1926, a 17-35 grass runway airport measuring 75 x 1000 meters was built on the land by the Dutch East Indies government (Purwayudhaningsari, Oetomo, Teki Tjendani, & Frengky Rumihin, 2023).

On August 8, 1928, the grass runway was landed for the first time by a tarpaulin-walled dragonfly aircraft, containing 2 Dutch companies. In 1939, it began to be landed by KLM aircraft containing

16 passengers. In 1942-1945, the Japanese government controlled it and built another runway 11-29, to be landed by DC 3 aircraft and fighter planes. The width of the runway strip is 150 x 1000 meters and the runway measures 30 x 900 meters. The runway 17-35 strip was also widened to 150 x 1200 meters and measures 30 x1000 meters. In addition, the Japanese government also built a military dormitory which is now used by the TNI AU Palembang Air Force Base (Minja & Mushi, 2023).

In 1945-1950 the Japanese government lost the war with the allies and surrendered, so the Dutch regained control of Talang Betutu Airport. At that time the Dutch also held an airfield liberation as stated in the situational picture in 1953, the Department of Public Works built this airfield. Based on the decision of the Chief of Staff of the Air Force No.023/P/KSTAF/50, issued on May 25, 1950, this airport was designated as an Air Force airbase from 1950 to 1953.

Year Based on the decree of the Commander of the Air Force and the Minister of Transportation No: No.23 of 1963/AU, dated July 15, 1963C.22/122/U(PHU), the Department of Public Works transferred the technical management of the airport to representatives of the Department of Civil Aviation in 1958. GIA Conviar 440 and Hercules AURI C-130 aircraft operated when the airport was designated as Talang Betutu Palembang Airport. Based on the joint decree of the Minister of Defense and Security/Commander of the Armed Forces, Minister of Transportation and Minister of Finance: No.Kep /30/IX/1975 KM/393/S/Phb-75 Kep-927 a/mk/IV/8/1975 dated 21-08-1975. When the airport status became Talang Betutu Palembang Airport, the runway became runway 11-29 with a width of 45 meters and a length of 1850 meters, while runway 17-35 was not used (Sawmya & Krishnan, 2023).

Based on the decree of the Minister of Transportation No. Km 76 AU.104 / Phb-85 dated April 3, 1985 and telex to the regional office II of the Directorate General of Air Transportation Palembang No. WP II / 1219 / Rm8 / A / 85 dated August 24, 1985, effective from September 1, 1985, the name of Talang Betutu airport was changed to Sultan Mahmud Badaruddin II Airport Palembang. The name was taken from the name of Sultan Mahmud Badaruddin II (1767-1862), an Indonesian National Hero against the VOC-Dutch who once led the Palembang Darussalam Sultanate (1803-1819). In 1984, the Indonesian Government established the Jakarta Cengkareng Airport Public Company (Perum) to manage Soekarno-Hatta Airport. In 1986, the name of this company changed to Perum Angkasa Pura II. This was also followed by a change in the name of Perum Angkasa Pura to Perum Angkasa Pura I which was tasked with managing airports in the eastern region of Indonesia (Guo, Li, Taylor, & Zhang, 2023).

Sultan Mahmud Badaruddin II Airport was officially taken over by PT (Persero) Angkasa Pura II on January 1, 1990. As a result, the new terminal building of Sultan Mahmud Badaruddin II Airport was finally completed and opened. After South Sumatra Province was officially selected to host PON XVI in 2004, the government attempted to increase the airport's capacity and upgrade its status to an airport.

On September 6, 2024, PT Angkasa Pura Indonesia was formed under the InJourney banner as a strategic solution to improve efficient and effective air connectivity, while supporting the tourism ecosystem to encourage economic growth and equality in Indonesia. The presence of PT Angkasa

Pura Indonesia (InJourney Airports) is expected to improve air connectivity, help expand the Indonesian tourism industry, expand the reach and speed of air logistics, and improve the efficiency and coherence of airport services in Indonesia (Liu et al., 2024).

The establishment of PT. Angkasa Pura Indonesia (InJourney Airports) is intended to maximize the empowerment of possible resources and the use of good corporate governance principles to run management and business in the field of aviation services and aviation-related services (Yıldız, Mutlu, Nagy, & Kale, 2023). This is expected to produce high-quality and highly competitive goods and services, so it can increase the value of a company and public trust (Khalef & El-adaway, 2023b). PT. Angkasa Pura Indonesia (InJourney Airports) has a target of providing infrastructure with the best service to help Indonesia's economic growth by connecting various countries and regions and providing an extraordinary travel experience that is reliable, consistent and enjoyable for all clients using contemporary technology (Gu, Wiedemann, Ryley, Johnson, & Evans, 2023).

RESULTS AND DISCUSSION

Airport General Data

Figure 1. Layout of Sultan Mahmud Badaruddin II Airport, Palembang

The Airport Operations Division is responsible for planning and implementing operational activities in accordance with its responsibilities to achieve the mission. The Airport Operations Division is supported in carrying out its responsibilities by a number of offices that report to it, including (Erivianto & Dani, 2024):

1. Airport Operation Air Side Department Head is responsible for arranging airside services at the terminal and its facilities (NANANG, 2023).
2. Airport Operation Land Side, Terminal & Service Improvement Department Head controls terminal services and facilities, landside, public lighting, aviation and tourism-related communication services for airport service users, entry and exit permit administration, and airport operational information systems.
3. Airport Rescue & Fire Fighting Department Head, responsible for handling medical crises in and around the airport workplace, as well as providing assistance in accidents and fires.
4. Airport Security Department Head, has responsibility for carrying out security measures at the airport workplace.

Airport Technical Division Head

Airport Technical Division Head has the main task of coordinating the implementation of service ability performance facilities, coordinating the implementation of temperature comfortability, coordinating the implementation of room area comfortability, coordinating the implementation of toilet comfortability, calculating investment absorption capacity and minimizing complaints from service users (Rosita, 2023). To carry out the functions and duties of the Airport Technical Division Head, he is assisted by several departments, namely:

1. Airport Equipment Department Head, responsible for performing maintenance tasks and reporting on water, AC, and electricity facilities. Ensure that every type of equipment under the team's scope is ready Airport Equipment Department Head in order to ensure smooth operations. Plan and implement equipment maintenance and repairs.
2. Airport Technology Department Head, Responsible for performing maintenance and reporting tasks on airport computers, electronics, and aviation telecommunications systems.
3. Airport Air Side & Facilities Department Head, Prepares and carries out maintenance tasks, reporting on building facilities, operations, runways, and the airport environment.
4. Airport Land Side & Facilities Department Head, Planning and implementing environmental building facilities at the airport, as well as their operation, maintenance and reporting.

Airport Commercial & Administration Division Head

Airport Commercial & Administration Division Head has the following duties:

1. Organize and carry out management tasks for commercial businesses.
2. Organize and carry out financial management tasks.
3. Organize and carry out accounting management tasks.
4. Organize and carry out equipment financial management tasks.
5. Organize and carry out general management, personnel, administrative and clerical tasks.

In carrying out its duties, Commercial and Administration is assisted by several services, namely:

1. Airport Commercial Department Head, carries out administrative duties regarding personnel, employee health and welfare, secretarial duties, housekeeping, protocol, data processing and managerial informatics management, as well as workforce preparation.
2. Human Capital Business Partner & General Services Department Head, is responsible for carrying out budgeting and administration tasks as well as equipment, warehousing and procurement administration (Fadylla & Azizah, 2023).
3. Corporate Social Responsibility Department Head, has the task of strengthening the positive impact of airport operations on local communities, tracking potential environmental and social impacts on local community habitats, taking necessary precautions & taking action for improvement.
4. Accounting Department Head, responsible for planning development and conducting commercial operations, such as collecting production data, finding out and making invoices for airline services and other companies that have airport operations (Muthmainnah et al., 2024).

5. Finance Department Head, has the task of coordinating financial, taxation, and budget activities, ensuring the availability of operational funds, managing accounting functions to process financial data and information, planning, managing, and controlling the company's budget & managing the financial report budget (Safitri, Devi, & Nugrahadi, 2024).

Scope of Implementation of On The Job Training

The implementation of On the Job Training (OJT) was carried out at the Main Power House, known as the airport electrical unit. The OJT program for the 20th Batch of Airport Electrical Engineering cadets of the Medan Aviation Polytechnic took place at *the Main Power House* (MPH) unit at Sultan Mahmud Badaruddin II Airport, from September 16, 2024 to February 03, 2025.

OJT activities are carried out in accordance with the competencies applicable in the *Main Power House unit* , which is part of the Operations and Engineering Division. This unit is responsible for the management of flight safety and service facilities, including supervision of electrical infrastructure, mechanical equipment, and other airport operational support facilities. Throughout the program, cadets are supervised by experienced supervisors to ensure that the training process runs smoothly, effectively, and in accordance with operational standard (Khairunisa, 2022).

Through this program, cadets get the opportunity to directly observe equipment operations, perform routine maintenance, and learn how to handle technical problems that may occur. In addition, this program provides practical insight into how to maintain the continuity and reliability of electrical systems in an airport environment that supports flight safety (Wijaya & Riananditasari, 2022).

With the OJT program, cadets not only gain work experience in the field, but are also able to apply the theories they have learned on campus in real situations. This is expected to prepare them to become professional workers in the airport electrical field (Prasetyo & Pramesti, 2024).

On The Job Training Implementation Schedule

The On the Job Training (OJT) program for cadets of the Diploma III Airport Electrical Engineering Program, class XX, Medan Aviation Polytechnic in 2024 will take place from September 16, 2024 to February 03, 2025. This program will be implemented at Sultan Mahmud Badaruddin II Airport.

The OJT activity went well without any obstacles in the field. During the implementation, cadets observed various equipment at the airport under direct supervision of field supervisors and technicians (Dwilaga, 2023).

Through this practice, cadets gain an understanding of the operation, maintenance, and how to handle problems that may arise related to equipment at the airport. The implementation of OJT activities takes place every day, from Monday to Sunday, with a duty schedule consisting of one day of morning duty, one day of evening duty, and one day off. The detailed schedule is listed in this report.

Office Hours:

Morning Service : 07.30 – 19.30 WIB

Night Service : 19.30 – 07.30 WIB

Normal Service : 07.30 – 16.30 WIB

The problem

When using a generator as a backup power source at SMB II Airport, it has a very important role to maintain consistency if something happens, especially in emergency conditions or power outages. However, the process of refueling the generator, the author sees problems or obstacles that can disrupt the smooth operation of this airport if there is a power outage . One of the main problems is the lack of a *real-time* fuel volume monitoring system , making it difficult for operators to know the availability of fuel in a timely manner. In addition, the refueling process that is still being carried out can increase the risk of errors, such as overfilling or underfilling.

The operation of the Sultan Mahmud Badaruddin II Airport generator is carried out periodically, namely during routine checks every Monday and Thursday, then during monthly simulations, and when there is a trip or PLN power outage (Lubis, Pane, Lubis, Siregar, & Kusuma, 2021).

Thus, the use of diesel fuel becomes routine and filling is done more often so that this problem shows the need for a more effective design of a fuel filling monitoring system in the generator tank . With this solution, the reliability of the generator at SMB II airport can be improved, supporting the safety, comfort, and smooth operation of the airport as a whole.

Figure 2. Current condition of the daily tank, (a) Right side view, (b) Left side view, (c) Top view.

Completion

Figure 3. Expected conditions

monitoring system consists of NodeMCU ESP8266 which functions as a system control center that regulates ultrasonic sensors to obtain real-time measurement data and has a WiFi module that sends data to the website for monitoring purposes. This system also has an ultrasonic sensor with the type JSN-SR04T which has the advantage of being resistant to wet and humid places which can be used to measure oil levels with a distance of 25 cm - 450 cm in the tank by producing a signal. This sensor has a better level of accuracy and precision than other sensors. The buzzer on this system functions as an alarm with a voltage of 12 volts

The working principle of this system uses a tank with a height of 150 cm and a width of 50 cm. An ultrasonic sensor is installed on the tank lid to measure the oil level. If the oil level in the tank is less than 15 cm and above 145 cm, an alarm will sound and if the level is above 15 cm and below 145 cm, the alarm will go off. The maximum volume of oil in the tank is limited to 150 cm and the minimum volume to 10 cm (Baskoro, 2023).

After the oil level data is obtained, the information will be sent by NodeMCU ESP8266 to the 16 x 2 LCD to be displayed. The data obtained by the ultrasonic sensor will be calculated and then sent to the database to be stored on the server. This data will then be displayed on the website in the form of a table that includes information such as day, date, time, and oil level.

Flow chart System

Flowchart is a diagram that uses certain symbols to describe in detail the sequence of processes and the relationship between one step and another in a project that is the result of an analysis of a problem and how to solve it. As follows (Fachri & Alwathani, 2023):

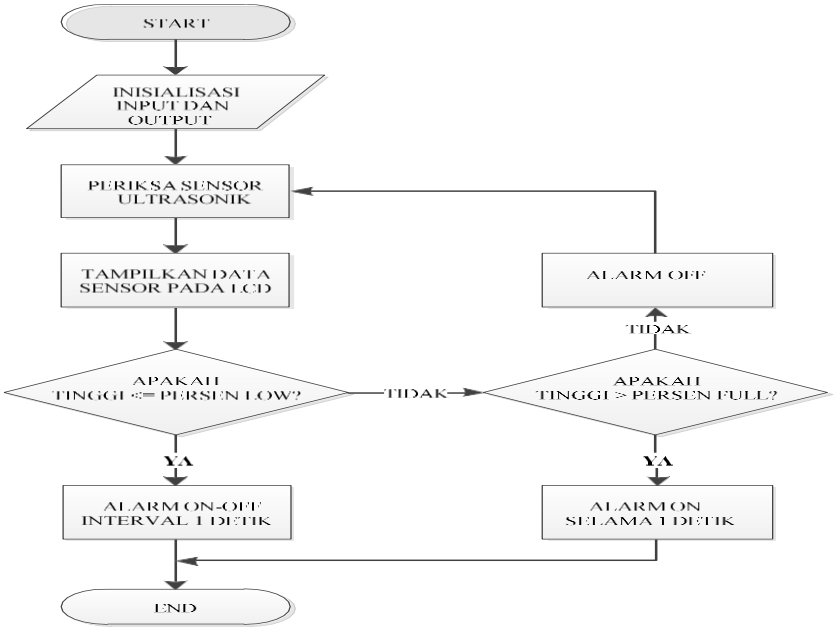

Figure 4. ***Flowchart of*** **the working system**

The image shows how the entire system works. The ultrasonic sensor functions as a water level distance meter. After the oil level is obtained, the data is entered into the NodeMCU Esp8266. In the NodeMCU Esp8266, the current height is calculated from the oil level obtained from the ultrasonic sensor, then the results of the height calculation will be displayed on the LCD. The results of the measurement are in the form of oil height in cm and in percent. When the oil level is less than the minimum limit and more than the maximum limit desired, an alarm will sound (MUHAMMAD, 2022).

System Block Diagram

This system block diagram shows the working process that uses ultrasonic sensors to monitor the generator tank. Data from the sensor is processed by a microcontroller, which is tasked with managing the data to be displayed on the LCD. The system block diagram can be seen as below:

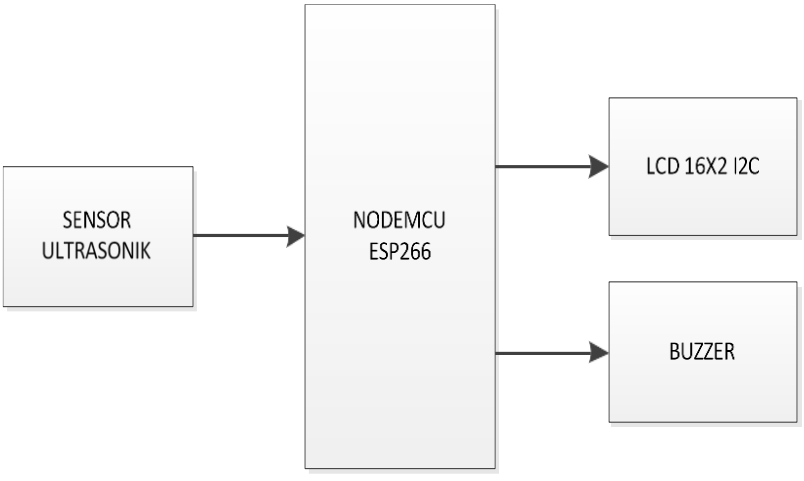

Figure 5. Blog system diagram

In the development process carried out by the author in solving the problem, there are several steps carried out, namely

a. Identification of problems

At this stage, a study was conducted on the existing problems, namely those related to automatic checking of fuel level conditions and processing of data on generator fuel usage in the *daily tank* .

b. Literature Study

This stage involves researching literature and references relevant to the design of a generator refueling monitoring system at the airport. This study includes an understanding of how the *NodeMCU Controller module works* which is connected to the internet for data transmission and system control, the use of fuel level sensors to detect fuel conditions in the tank, and the development of a data input system for generator usage at the airport (Fadli, Yuliana, & Yanuartanti, 2024).

c. Hardware Design

Hardware design involves the integration of various components such as modules, power supplies , microcontrollers, ultrasonic sensors, and LCD displays. This aims to detect the fuel level of the generator tank at SMB II Airport. This system is also designed to provide information when the fuel level reaches a minimum (10%) and maximum (95%) condition, as well as adding real-time data input features every time the oil increases or decreases.

System Wiring Diagram

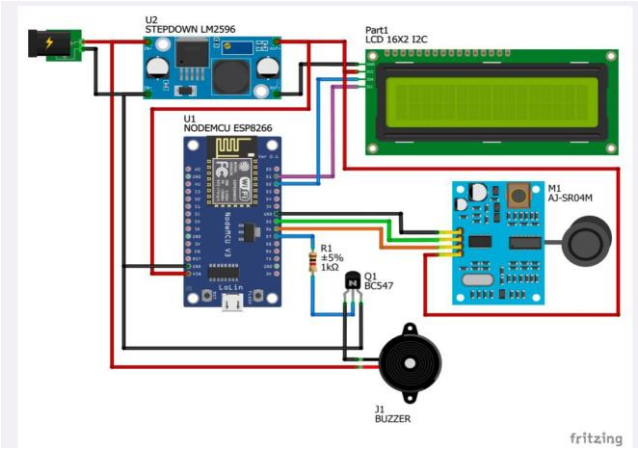

Figure 6. System Wiring Diagram

The following are the functions of the tools in the circuit image above:

1. Ultrasonic sensor to detect the amount of oil in the tank.
2. NodeMCU Esp8266 functions as Arduino, namely as *a controller* and a wifi module for sending data, because this NodeMCU is equipped with an esp8266 wifi module.
3. LCD to display distance and oil level data from the ultrasonic sensor.
4. *Buzzer* as an alarm when oil exceeds the maximum and minimum limits
5. *Project board* as a place for electronic components to become electronic circuits without soldering.

monitoring system uses an Arduino microcontroller that functions to control the sensors in the input and output parts of the system. In the input part there is an ultrasonic sensor that works to provide data on the height of the fuel in the tank, the data is processed by Arduino and provides output in the form of height data displayed on a 16 x 2 LCD screen.

Equipment Cost Budget Details

Table 1. RAB Table of Tool Components

No	Component Name	Specification	Unit Price (IDR)	Amount	Total Price (IDR)
1	Ultrasonic Sensor	JSN-SR04T *(Waterproof)*	80,000	1	80.000
2	*Buzzer* 12V	*Piezoelectric*	15.000	1	15.000
3	LCD *Display*	16x2 I2C	45.000	1	45.000
4	NodeMCU ESP8266	*WiFi Module*	75.000	1	75.000
5	Kabel Jumper	*Male to Male* 10 cm (Set 40 pcs)	20.000	1 set	20.000
	Total Biaya				**235.000**

The cost of making this controller system program tool is estimated at around Rp.235,000. This expenditure is minimal but provides significant benefits for the *Main Power House unit* in increasing the efficiency of the monitoring process and recording usage data automatically (Toha, Juniah, & Yusuf, 2022). In addition, this system is expected to be implemented comprehensively in all generator areas at Sultan Mahmud Badaruddin II Airport.

CONCLUSION

a. The design of this tool works well, by using an ultrasonic sensor to determine the fuel capacity level in the generator tank which will be displayed.
b. Through the flow sensor, you can also find out how much fuel flow will be refilled and how much has been used by the generator via the display on the 16 x 2 LCD.
c. The presence of a fuel filling monitoring system makes it easier for technicians to monitor and manage generator fuel, so that the process becomes more efficient and practical.

Conclusions on On The Job Training

After carrying out On The Job Training (OJT) activities at Sultan Mahmud Badaruddin II Airport, Palembang, I drew the following conclusions regarding the implementation of OJT:

a. Keep equipment in optimal condition with maintenance and repairs carried out daily, weekly, monthly and annually in the electrical unit according to the established schedule.

b. During the implementation of On The Job Training, cadets can learn about the activities and problems that occur at Sultan Mahmud Badaruddin II Airport, Palembang.
c. Gaining experience, learning, family and responsibility during OJT activities leaves a good impression on cadets.
d. Cadets can apply the theories they gain during their education and then compare them with conditions in the field.
e. When doing work or repairs, you don't do it alone because technicians are a team that helps each other.

Suggestion

a. To increase the accuracy and level of precision in detection, other sensors can be used that have specifications with a higher level of accuracy.
b. The placement of ultrasonic sensors to measure fuel oil usage must be done precisely and accurately to ensure that the measurement results are in accordance with the actual conditions being monitored.
c. This system can be designed to monitor the performance of multiple generators located at different locations and integrate them all into one monitoring point for monitoring efficiency.
d. Adds an automation system feature that automatically and predictively detects potential generator problems or failures before they occur.
a. Technicians must wear uniforms and safety equipment and follow Standard Operating Procedures (SOP) to increase comfort and safety at work.
b. Electrical equipment at the Airport and Electrical Unit is required to have a centralized monitoring and control system, especially to enable technicians to respond to damage and disruptions that occur more quickly and efficiently.

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