Automatic Floodlight Control (Autofcon) on *Apron Floodlight* (Case Study of Class III UPBU Namrole Airport)

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Abstract
Floodlight is a lamp that is installed in the parking stand area with certain conditions to illuminate the Apron area if the Apron requires lighting and is intended for use at night. General floodlights are provided by airports, while additional lighting can be provided by airlines to suit special activities. In Annex 14 for the recommended location Floodlight on the Apron must be located in such a way as to provide adequate lighting in the Apron area served. This research was conducted at Namrole Airport, Maluku. This study aims to find out the work system and procedures for maintaining equipment at the airport, especially in the field of airport electrical engineering and create a forward and structured mindset and build communication and cooperation in the world of work with other colleagues. The research method in this study uses a qualitative descriptive method. Data collection techniques carried out using observation, documentation and drawing conclusions. From the results of solving problems with Floodlight at Namrole Airport, Maluku, it can be concluded that Autofcon uses Photo Cell Sensor in its working system. Autofcon provides automatic lighting during bad weather, as well as changes to the night to facilitate activities to turn on the lights so that it is more time efficient and prevents incidents when there is movement on the apron side. apron Floodlight provisions are regulated in PR 21 Kemenhub 2023 regarding providing sufficient lighting throughout the apron service area.

Keywords: Automatic Floodlight Control (Autofcon), Apron Floodlight

Introduction

Era 4.0 invites the world to continue to develop towards a better and more modern era, where all aspects that influence the progress of a country become the main focus developed in the world. Indonesia is an archipelago with more than 17,000 islands spread from Sabang to Merauke, continuing to encourage in the advancement of this digital era. The position of the island which is located far from the 5 large islands makes the Indonesian nation continue to build transportation facilities to connect all regions. Air transportation is one of the types of connections that can provide efficiency of time and work.

Airport or also called Airport is a place for airplanes to take off or land. A simple airport has at least one runway, at a large airport is usually supported by additional facilities, both for the purpose of serving operators and users of flight services.

Class III UPBU Namrole Airport is supported by Airfield Lighting System (ALS) such as Flood light, PAPI (Precision Approach Path Indicator), WindCone, and Runway Threshold Indicator Light (RTIL). Lighting facilities on the Apron or aircraft parking area which are commonly called Apron *Floodlight* at Class III UPBU Namrole Airport.

Currently, the airport still uses manual operation to turn on the flood light control. This is one of the concerns that could potentially disrupt operational activities when there is apron traffic at night or in bad weather, so an automatic tool is needed that can provide lighting without human assistance.

Automatic Floodlight Control (AUTOFCON) is an innovation in this research that functions as an automatic control tool for Apron Floodlight during bad weather or at night. Adopting the principle of light sensors in running it. This tool is able to work in a *zero human manner* by providing lighting and managing connected light data to carry out full control in opening and closing the electric current on the Apron floodlight lamp.

Research methods

The type of research in this study uses a qualitative descriptive method. Data collection techniques are carried out using observation, documentation and drawing conclusions. The research was conducted from August 29, 2024 to September 29, 2024. Coinciding with Class III UPBU Namrole Airport, Maluku.

Results and Discussion

When there is a change from day to night or dark skies When the weather is bad, it causes several problems, one of which is in the lighting section. This also has an impact on Floodlight which is one of the Airport lighting systems. Floodlight itself uses two types of lamps that have different characteristics. Halogen and LED are the types of lamps that are commonly used. In this case, UPBU Namrole Airport uses Halogen lamps in the Floodlight lamp system. The use of Halogen in the lighting system is the right thing to do, but looking at it from an economic perspective, the use of Halogen will have an impact on the funds that must be spent:

Table 1. Advantages and disadvantages of halogens

Excess light Halogen	Lack light Halogen
Capable penetrate fog	Light Which produced No too bright
Price Which more affordable	Own age Which short
Ray Which No dazzling	It takes more time in the lighting process

Table 2. Advantages and Disadvantages of LEDs

Excess light LED	Lack light LED
It takes a short time to operate	The price is relatively expensive
Small power	Can't penetrate the fog
Brighter	If it is damaged, you must replace it with the module.

AUTOFCON is one of the innovations that is expected to provide something new in the world of aviation, especially in the lighting section that can help in the service process carried out in the Airport area. AUTOFCON is able to adapt to existing developments in order to provide

upgrades that will later maximize the performance of this tool and of course in *upgrading* the lighting system at the Airport. AUTOFCON is expected to be able to help the work of technicians and Air Traffic Controllers with existing *self-control* . The use of digital tools is intended to facilitate the process of each component and save costs from the components of the tool. AUTOFCON is also able to provide efficiency and lighting settings to reduce the economic burden of an Airport. This tool can detect incoming light and order the lights to turn on by themselves at night or when the sky is dark when the weather is bad. With light and current sensors, Autofcon can work optimally and efficiently in any weather conditions.

a. Floodlight Sketch Current condition with desired condition and LED light requirement for *back-up* .

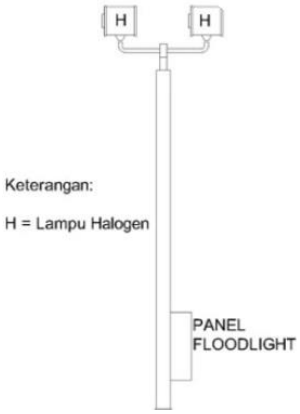

Figure 1. Floodlight
Current state

Figure 2. Floodlight
Desirable state

In figure 1 there are 2 lamps consisting of 2 400 watt Halogen lamps connected in parallel. (Data is listed on the packaging and attached in the "Attachment" section).

b. Calculation of the Photo Cell selection used for the required AUTOFCON:
   1) Protection/ *Breaker*

$$\boldsymbol{I = \frac{P}{v}}$$

$$I = \frac{800}{220} = 3{,}63A$$

Therefore, the Photocell used has a capacity of 6 Ampere and the protection used is *a Miniature Circuit Breaker (MCB)* with a capacity of 4 Ampere.

   2) Cable type

I=P/(V x Cos phi)
I=800/(220 x 0.85)
I=800/187
I=5.347…(2)

KHA=125% x I
KHA=125% x 5.347
KHA=6.683A

So, based on the KHA calculation with the NYA cable on the cable, it was concluded that the KHA value of 6.68 was rounded up to 7A or tolerated at 10A, suitable for cables with a cross-sectional area of 1.5mm2 .

c. AUTOFCON Wiring

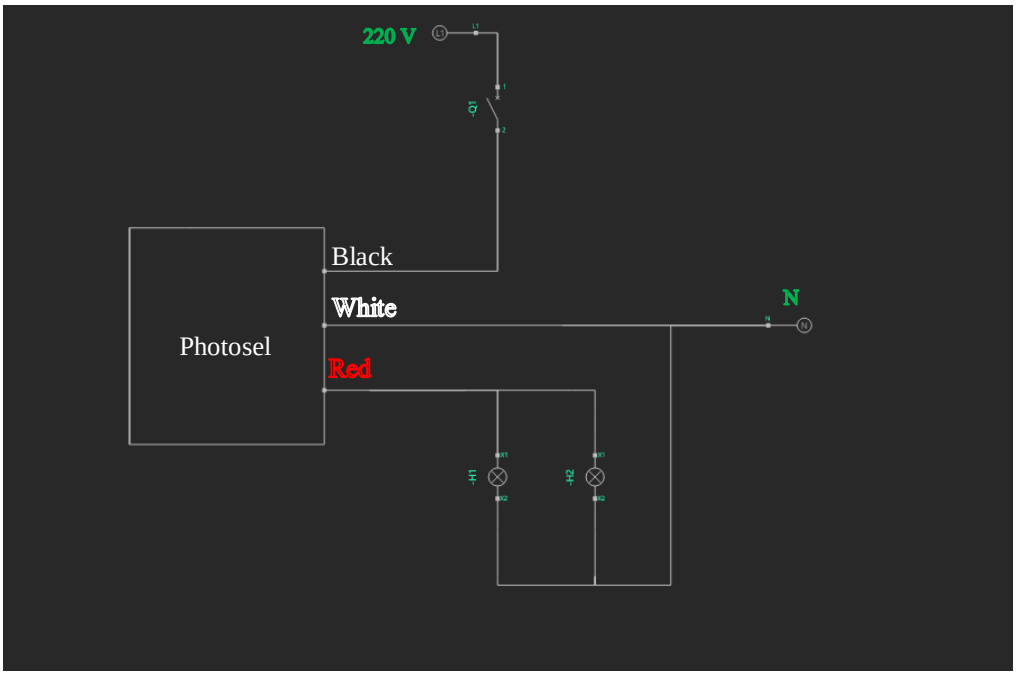

Figure 3. AUTOFCON Wiring

AC voltage enters the Floodlight panel where in the panel there is *a Miniature Circuit Breaker (MCB)* with a capacity of 4 Ampere, then the output from the Floodlight panel enters the AUTOFCON Box which contains a Photocell with 3 legs colored red, black, and white. Each color has its own relationship, for the black leg it is connected directly to the 220 Volt AC voltage source, for the white one it is connected in parallel with the neutral cable of the voltage source and the neutral cable of the Floodlight lamp, while the red one is connected to the voltage cable of the Floodlight lamp.

d. AUTOFCON component installation scheme

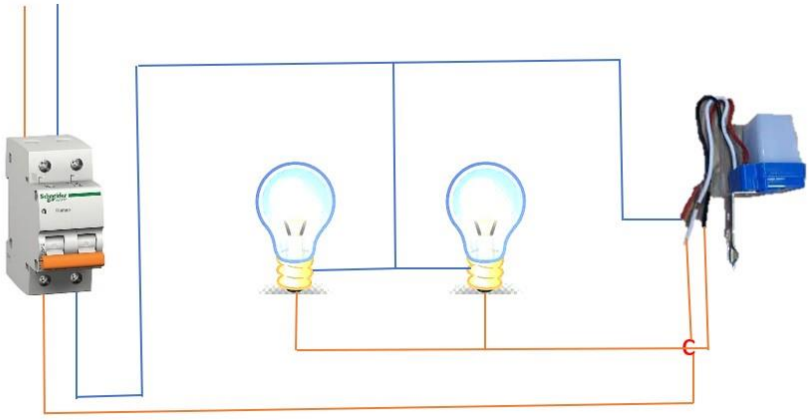

Figure 5. Schematic

e. How it Works and Flowchart

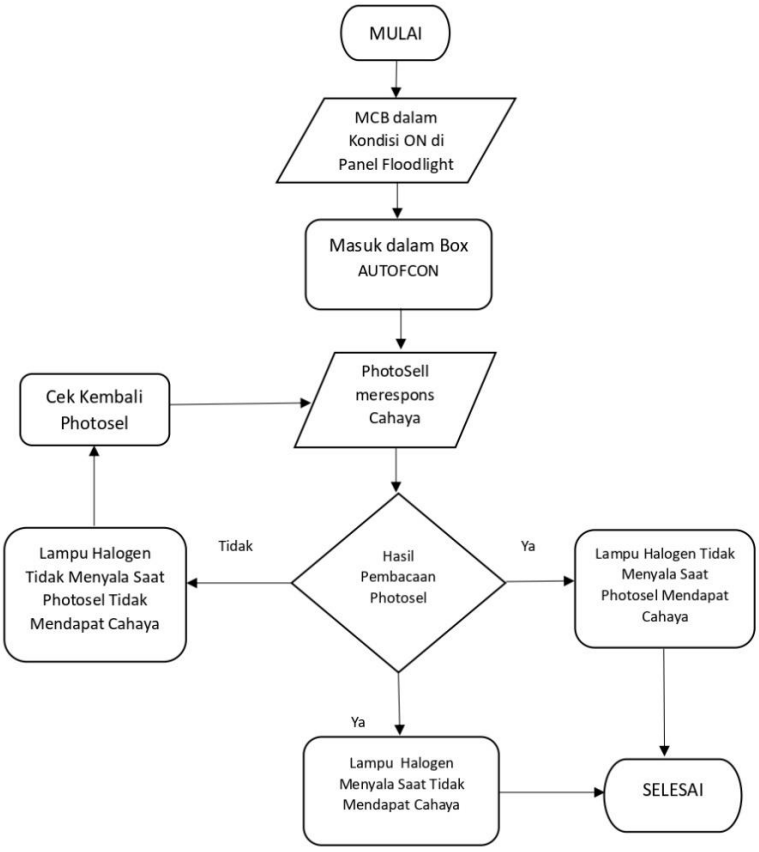

Figure 6. Autofcon work flowchart

f. Installation Procedure

1) Technicians must be more than 2 people
2) Technicians must have an electrical license
3) Make sure the Floodlight MCB panel is turned off
4) After that, determine the leg connections on the Photosel.
5) Connect the black leg to a 220 Volt AC voltage source.
6) Connect the white leg in parallel with the neutral cable of the voltage source and the neutral cable of the Floodlight lamp.
7) Connect the red leg to the Floodlight voltage cable.
8) Place the Photocell in a place that is not blocked by any objects and gets optimal light (recommended above the *Floodlight pole*)
9) Turning the MCB back on on the Floodlight panel
10) Test the tool by covering the photocell with something that blocks the entry of light.

g. Proof

1) Autofcon when not getting voltage and bright condition.

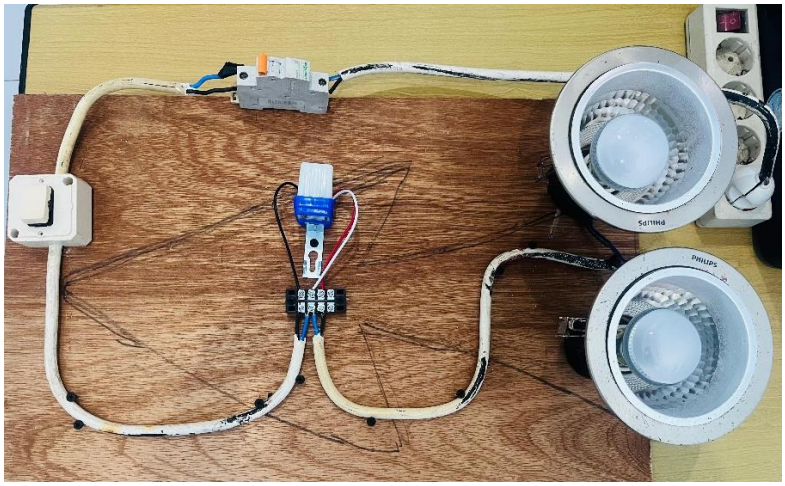

Figure 7. Autofcon when it has not received voltage and is in bright condition.

2) Autofcon when getting voltage and bright condition.

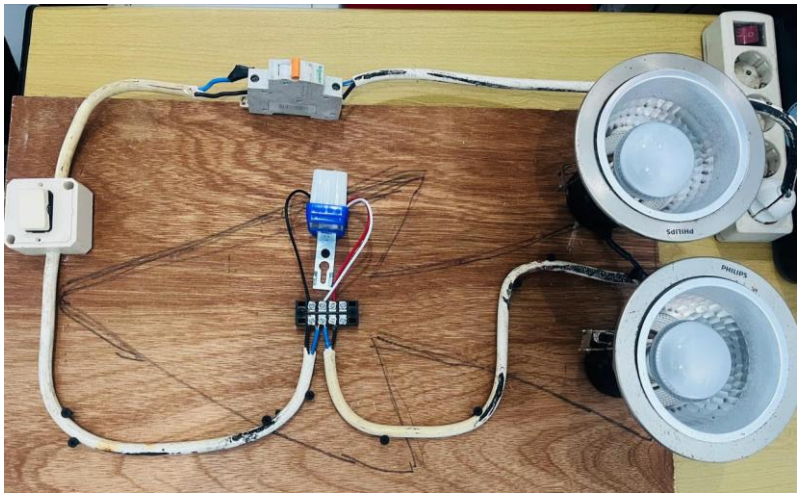

Figure 8. Autofcon when getting voltage and bright state

3) Autofcon when getting voltage and dark condition.

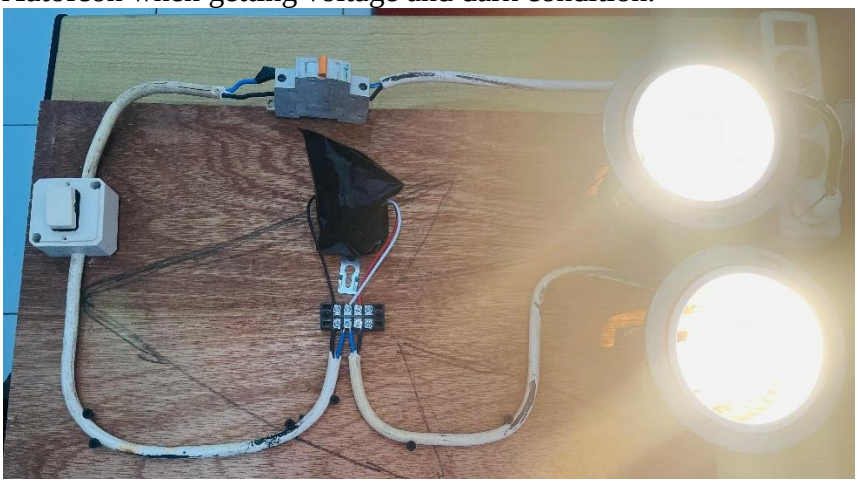

Figure 9. Autofcon when it is dark and receiving voltage

Conclusion

The conclusion of the problems that occurred at Class III UPBU Namrole Airportnamely the addition of AFL facility control to the Autofcon tool:

1. Autofcon uses 1 sensor in its working system which helps the automatic system on this tool.
2. Autofcon helps provide automatic lighting assistance so that technicians do not need to turn it on manually anymore.
3. The provisions for apron floodlights are regulated in PR 21 of the Ministry of Transportation in 2023 and PR 008 of the Ministry of Transportation in 2022 concerning providing adequate lighting throughout the apron service area.

Suggestion

The addition of this tool is expected to be one of the ideas that can help performance at Class III Namrole UPBU Airport.

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