ISSN No:-2456-2165

Analysis of Generator Set Maintenance and Maintenance Management of Hotel MG Setos Semarang Building

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Abstract:- The hotel industry is an industry that never stops 24 hours a day, inseparable from energy needs. The energy needed is electrical energy, the portion of the use of electrical energy and the allocation of funds for its supply is the largest in this industry. Because the current electricity source is very crucial, every hotel must have a generator that will replace the electricity source if the PLN electricity source is cut off. In the use of generators, maintenance must be carried out regularly, therefore care and maintenance must be carried out in accordance with the Standard Operational for generator maintenance.The purpose of this research is to analyze the management of generator set maintenance and maintenance and to develop specific operational standards for generator set maintenance and maintenance as well as generator set maintenance cost plans. The method used is a direct survey method to the field and data collection using a questionnaire. From the results of this study it was concluded that the lack of SOPs in care and maintenance led to reduced durability and reliability of the generator set engine and after going through the analysis, the generator set engine maintenance cost for one year was Rp. 20.531.400,-.

Keywords: *Maintenance Management, Generator Set, Maintenance Cost.*

I. INTRODUCTION

The hotel industry is an industry that never stops 24 hours a day, inseparable from energy needs. The energy needed is electrical energy, the portion of electricity consumption and the allocation of funds for its provision is the largest in this industry. According to (Sri Perwani, 1992) the word hotel began to be used since the 18th century in London, England. At that time the word hotel was " garni "a large house equipped with accommodation facilities or residence for rental on a daily, weekly or monthly basis. Hotel is an industry or service business that is managed commercially (Hermawan, H., Brahmanto, E., & Hamzah, 2018). Because the current source of electricity is very crucial, every hotel must have a generator that will replace the electricity source if the PLN electricity source is cut off. In using Gensets, periodic maintenance must be carried out. According to (Assauri, 2008) Maintenance is an activity to maintain or maintain facilities/equipment and make repairs or adjustments and replacements needed so that there is a satisfactory production condition in accordance with what is planned. maintenance) is an activity that plays an important role in an industrial company and is just as important as other activities such as the procurement and control of raw materials, all of which are intended so that the activities carried out can run smoothly without any interruptions (Hendrik, 2011). Genset maintenance on a regular basis is needed to maintain the reliability of the generator so that it can replace the power source when the power from PLN goes out. This problem is studied to obtain an SOP arrangement and maintenance costs that can be used as a reference for generator maintenance. This research was conducted in the Hotel and Office Building MG Setos Semarang.

II. RESEARCH METHODS

The data collection process was carried out in accordance with observational data collection techniques, interviews, and data collection derived from literature studies.

➢ *The Primary Data Needed for this Research Process are as Follows*:
- Questionnaire Data and Documentation.

➢ *The Secondary Data Required for this Research Process are as follows*:
- List of generator damage.
- Generator specifications.
- Data on solar needs.
- Report fuel tank volume.

➢ *Data Analysis and Processing Carried Out are as Follows:*

- *Perform Maintenance and Maintenance Management Analysis on Generator Set*

✓ Analyze generator maintenance management in buildings and make comparisons with existing literature and regulations
✓ Comparison and analysis is carried out based on the Regulation of the Minister of Tourism and Creative Economy of the Republic of Indonesia Number

Pm.53/Hm.001/Mpek/2013 concerning Hotel Business Standards.

- *Prepare SOP for Generator Maintenance for Hotel Buildings*

✓ Compile a questionnaire regarding genset maintenance procedures obtained based on the genset manufacturer's manual and maintenance requirements. It was proposed to respondents from several different places.
✓ Analyzing the results of the questionnaire in the form of data on the number of respondents and the choice of respondents
✓ Prepare SOP and maintenance schedule based on the results of the questionnaire

- *Calculate the Annual Maintenance Budget Plan*

✓ Calculating the budget by multiplying the need for spare parts and other maintenance support needs with the price and cost of dismantling.
✓ In calculating the maintenance budget plan, maintenance schedule data is used, number of spare parts, number of components, prices based on official generator manufacturer dealers, and prices based on field surveys in the Semarang area.

III. RESULTS AND DISCUSSION

➢ *Maintenance Management*

- *Electrical Power Requirements*

Based on existing observations and direct interviews with the engineering department, the electric power installed at the MG Setos Semarang hotel was supplied by PLN of 1248 KVA, with 1 transformer with a capacity of 2500 KVA and 2 generator sets, each with a capacity of 1500 KVA with 1 generator acting as a generator. main generator and 1 generator acts as a backup generator.

- *Genset Maintenance*

✓ *Component Inspection*

This activity aims to determine the condition and state of the generator components and aims to ensure the components are in good condition. If damage or discrepancies are found in components, action must be taken immediately according to the damage experienced.

✓ *Genset Warming Up*

The warmingup generator aims to make the engine more ready to operate if at any time there is a power outage from the PLN. Besides that, heating the generator also aims so that the engine oil can optimally lubricate the engine components.

➢ *SOP Preparation*

SOP preparation is carried out in several stages to obtain procedures that can be used effectively, are communicative and easy to understand. The essence of making SOPs is to provide practical guidelines for staff or workers to carry out their work correctly according to procedures without having to be supervised.

- *Preparatory Stages*

The technical stages of SOP preparation begin with the preparation stage. This stage aims to understand the need for the preparation or development of SOPs and develop alternative actions that must be carried out by the work unit which consists of 4 (four) steps, namely: a) Know the needs. b) Evaluate and assess needs. c) Define needs. d) Define alternative actions.

The product of this stage is a decision regarding alternative actions to be taken.

The need for generator set care and maintenance methods includes:

- *Generator Room*

Generator Room Consists of:

✓ Cleaning the generator room area
✓ Checking generator room facilities
✓ Checking the supporting tools for the maintenance and cleanliness of the generator room

- *Generator Panel Room*

Genset Panel Room consisting of:

✓ Cleaning the Genset Panel room area
✓ Checking the generator panel room facilities
✓ Checking maintenance support tools and cleanliness of the generator panel room

- *Fuel Tank Room*

The Fuel Tank Room consists of:

✓ Cleaning the fuel tank room area
✓ Checking the facilities of the fuel tank room
✓ Checking maintenance support tools and cleanliness of the fuel tank room

➢ *Compilation of Questionnaires*

The preparation of the questionnaire was based on the manual obtained from the generator manufacturer's authorized dealer. However, the manual only focuses on the maintenance of the machine, while in terms of maintenance requirements, there are several other aspects of the need. Then a questionnaire was compiled which was compared to produce SOPs that were effectively used. In preparing the questionnaire using the Likert scale as a reference in the respondents to express their opinion in the form of a numerical scale. As explained by (Taluke et al., 2019) the Likert scale answer forms consist of strongly agree, agree, disagree, and strongly disagree. So in this study the format of the respondent's scale in this questionnaire was from strongly disagree (STS) to strongly agree (SS). The results of preparing the questionnaire can be seen in Table 1.

ISSN No:-2456-2165

Table 1 Questionnaire Preparation

PETUNJUK PENGISIAN KUESIONER

BAGIAN 1 : IDENTITAS RESPONDEN ☐ **Kepala Staff Engineering**

☐ **Staff Engineering**

Bapak/Ibu/Sdr dimohon dengan hormat untuk mengisi identitas secara lengkap, dan memberi tanda ceklis (√). Setiap pertanyaan dimohon hanya satu jawaban.

a. Nama : .....

b. Pekerjaan/Jabatan : .....

c. Jenis Kelamin : ☐ Pria ☐ Wanita

d. Usia : ☐ ≤ 25 th ☐ 26–35 th ☐ 36-45 th ☐ 46-55 th ☐ 56-65 th

e. Lama Bekerja : ☐ 1-5 th ☐ 6-10 th ☐ 11-15 th ☐ 16-20 th ☐ > 20 th

BAGIAN 2 : IDENTITAS GEDUNG

a. Nama Gedung : .....

b. Alamat Gedung : .....

c. Fungsi Gedung : .....

BAGIAN 3 : KUESIONER

1. Mohon memberi tanda cek (√) pada kolom pilihan angka skala respon yang Bapak/Ibu/ Sdr anggap paling sesuai pada Daftar Pertanyaan di halaman berikutnya.
2. Keputusan Bapak/Ibu/Sdr akan digunakan untuk menentukan standar operasional perawatan dan pemeliharaan generator set Gedung Hotel MG Setos Semarang agar sesuai dengan harapan pengguna gedung, yakni tamu, *tenant*, dan staf/ karyawan gedung.
3. Pengisian kuesioner dilakukan berurutan sesuai dengan chapter chapter dan angka pada form kuesioner.

Format Skala Respon :

1 : Sangat Tidak Setuju (STS) 5 : Setuju (S)

3 : Tidak Setuju (TS) 7 : Sangat Setuju (SS)

Format skala respon di atas menunjukkan skala pendapat dari responden. Angka 7 adalah yang tertinggi menunjukan sangat setuju (SS) dan angka 1 adalah yang terendah menunjukkan sangat tidak setuju (STS). Angka 2, 4, dan 6 boleh dipilih yang merupakan nilai antara.

Terimakasih atas partisipasi Bapak/Ibu/Sdr dalam mewujudkan upaya peningkatan layanan dalam perawatan dan pemeliharaan generator Set

ISSN No:-2456-2165

A. PERAWATAN DAN PEMELIHARAAN MESIN GENSET

I. CHAPTER DATA GENSET

a. Apakah gedung ini menggunakan Generator set?

☐ Ya ☐ Tidak

b. Berapa jumlah generator set yang digunakan?

☐ 1 ☐ 2 ☐ 3 ☐4 ☐ 5 ☐ Lainnya ……..

c. Berapa daya yang dapt dihasilkan dari genset tersebut?

☐ 0 < 500 kva ☐ 500 – 1000 kva ☐ 1000 – 1500 kva

☐ 1500 -2500 kva ☐ 2500 – 4000 kva ☐ Lainnya ……..

d. Apakah daya yang dihasilkan sudah dapat memenuhi kebutuhan gedung?

☐ Ya ☐ Tidak

e. Apakah dilakukan perawatan?

☐ Ya ☐ Tidak

f. Berapa frequensi perawatan yang dilakukan?

☐ Harian ☐ Bulanan ☐ Mingguan ☐ Tahunan

☐ Lainnya ……..

g. Berapa umur genset gedung ini?

☐ 0 < 50 Jam ☐ 50 – 100 Jam ☐ 100 – 150 Jam

☐ 150 -250 Jam ☐ 250 – 500 Jam ☐ Lainnya ……..

II. CHAPTER UMUM

NO	PROSEDUR	SKALA RESPON						
		1	2	3	4	5	6	7
1	Perawatan dan pemeliharaan Mesin Genset hanya dijinkan dilaksanakan oleh Staff Engineering terkait.							
2	Kunci ruangan Genset hanya dapat diakses oleh Staff Engineering terkait							
3	Pengecekan Mesin Genset dilakukan sesuai jadwal pemeliharaan							
4	Sebelum kegiatan perawatan dan pemeliharaan Mesin Genset dilaksanakan, Staff Wajib mengenakan alat pelindung diri :							
5	APD yang dimaksud : - Safety Shoes							
6	APD yang dimaksud : - Celana panjang							
7	APD yang dimaksud : - Seragam Kerja							
8	APD yang dimaksud : - Sarung tangan							
9	Pengecekan Mesin Genset meliputi Pengecekan Sambungan (Konektivitas) baterai							
10	Pengecekan Mesin Genset meliputi Pengecekan Level oli Mesin							
11	Pengecekan Mesin Genset meliputi Pengecekan Level Cairan Pendingin mesin							
12	Pengecekan Mesin Genset meliputi Pengecekan Sistem Bahan bakar							
13	Pengecekan Mesin Genset meliputi Pengecekan Sistem mekanis udara							
14	Pengecekan Mesin Genset meliputi Pengecekan Belt Mesin							

1 : Sangat Tidak Setuju (STS) 3 : Tidak Setuju (TS) 5 : Setuju (S) 7 : Sangat Setuju (SS)

III. CHAPTER PERAWATAN BATERAI								
NO	PROSEDUR	SKALA RESPON						
		1	2	3	4	5	6	7
1	Periksa sambungan terminal baterai, dengan indikator sambungan terminal harus kencang untuk menghindari hambatan listrik.							
2	Periksa wadah baterai dan bracket, dengan indikator wadah dan bracket harus tetap dalam keadaan kering							
3	Pengecekan konektifitas baterai bersifat harian (daily)							
4	Pengisian formulir pengecekan baterai							
5	Formulir pengecekan baterai berisi kesesuaian tegangan							
6	Formulir pengecekan baterai berisi kesesuaian Konektifitas Terminal							
7	Formulir pengecekan baterai berisi Kondisi bracket							

IV. CHAPTER PERAWATAN SISTEM PELUMASAN								
A	Pengecekan Oli Mesin							
NO	PROSEDUR	SKALA RESPON						
		1	2	3	4	5	6	7
1	Pengecekan dilakukan melalui katup indikator (Dipstick)							
2	Pengecekan dilakukan dengan membersihkan terlebih dahulu indikator dipstick dengan kain lap bersih. Kemudian masukan dan keluarkan lagi dan periksa							
3	Pengecekan Oli mesin difungsikan untuk mengetahui kapasitas oli mesin							
4	Pengecekan Oli mesin difungsikan untuk mengetahui Kondisi kualitas Oli mesin							
5	Pengisisan formulir pengecekan Oli mesin							
6	Formulir pengecekan Oli mesin berisi Kapasitas Oli							
7	Formulir pengecekan Oli mesin berisi Kondisi kualitas Oli							

B	Penggantian Oli Mesin dan Filter							
NO	PROSEDUR	SKALA RESPON						
		1	2	3	4	5	6	7
1	Penggantian Oli Mesin dan Filter dilakukan 6 bulanan							
2	Penggantian oli mesin dan filter dilakukan dengan oli dan filter sesuai rekomendasi dari pabrikan genset							
3	Penggantian oli mesin dan filter harus sesuai dengan alur penggantian							
4	Dilakukan pembersihan sisa sisa oli setelah oli dikeluarkan							
5	Pengisian formulir pengecekan Oli mesin							
6	Pengisian oli dengan memperhatikan kapasitas oli yang sesuai							
7	Pembuangan oli bekas sesuai dengan peraturan lingkungan setempat							

V. CHAPTER PERAWATAN SISTEM PENDINGIN MESIN								
A	Pengecekan Level Pendingin Mesin							
NO	PROSEDUR	SKALA RESPON						
		1	2	3	4	5	6	7
1	Pengecekan dilakukan pada komponen pendingin mesin							
2	Pengecekan kapasitas pendingin mesin dengan indikator berkurang atau tidak							
3	Penambahan pendingin mesin dilakukan apabila tingkat kapasitas pendingin mesin berkurang							
4	Penambahan pendingin mesin menggunakan cairan pendingin sesuai dengan rekomendasi mesin pabrikan							
5	Pengisisan formulir pengecekan sistem pendingin mesin							
6	Formulir pengecekan sistem pendingin mesin berisi Kapasitas (coolant)							
7	Formulir pengecekan sistem pendingin mesin berisi Kondisi kualitas pendingin mesin (coolant)							

VI. CHAPTER PERAWATAN SISTEM BAHAN BAKAR								
A	Pengecekan Sistem bahan bakar							
NO	PROSEDUR	SKALA RESPON						
		1	2	3	4	5	6	7
1	Pengecekan pipa pipa suplai bahan bakar dengan indikator tidak ada kebocoran							
2	Pengecekan tanki harian bahan bakar dengan indikator tercukupi							
3	Pengisian Formulir pengecekan sistem bahan bakar							
4	Formulir pengecekan bahan bakar berisi kondisi saluran pipa-pipa suplai							
5	Formulir pengecekan bahan bakar berisi volume bahan bakar pada tanki harian							
6	Formulir pengecekan bahan bakar berisi ketersediaan tanki harian							
7	Tanki harian berada pada ruangan yang sama dengan generator							

B	Penggantian Filter Bahan Bakar							
NO	PROSEDUR	SKALA RESPON						
		1	2	3	4	5	6	7
1	Penggantian Filter bahan bakar dilakukan 6 bulanan							
2	Penggantian filter bahan bakar dilakukan dengan filter sesuai rekomendasi dari pabrikan genset							
3	Penggantian filter bahan bakar harus sesuai dengan alur penggantian							
4	Dilakukan pelepasan terminal negatif dari baterai terlebih dahulu sebelum penggantian filter							
5	Dilakukan penutupan saluran bahan bakar ketika penggantian filter menghindari kebocoran							
6	Penggantian filter dilakukan dengan peralatan yang memadai							
7	Pemasangan kembali terminal negatif dari baterai							
8	Pembuangan filter bekas harus sesuai dengan peraturan lingkungan setempat							

ISSN No:-2456-2165

BAGIAN 4 : KUESIONER JADWAL PERAWATAN DAN PEMELIHARAAN

1. Mohon memberi tanda cek (√) pada kolom pilihan waktu perawatan dan pemeliharaan menurut pendapat Bapak/Ibu/ Sdr yang dianggap paling sesuai pada penentuan jadwal perawatan dan pemeliharaan generator.
2. Keputusan Bapak/Ibu/Sdr akan digunakan untuk menentukan Jadwal perawatan dan pemeliharaan generator set Gedung Hotel MG Setos Semarang agar sesuai dengan harapan pengguna gedung, yakni tamu, *tenant*, dan staf/ karyawan gedung.

No	Jenis Perawatan	Waktu Perawatan dan Pemeliharaan				
		Harian	Mingguan	Bulanan	6 Bulan	Tahunan
1	Inspeksi					
2	Pemeriksaan Kebersihan Ruang Generator					
3	Pemeriksaan Fasilitas Ruang Generator					
4	Pemeriksaan Kebersihan Ruang Panel					
5	Pemeriksaan Fasilitas Ruang Panel					
6	Pemeriksaan Kebersihan Ruang Tanki Bahan Bakar					
7	Pemeriksaan Fasilitas Ruang Tanki Bahan Bakar					
8	Pemeriksaan Level Coolant					
9	Pemeriksaan Level oli					
10	Pemeriksaan Level solar					
11	Pemeriksaan saluran udara					
13	Pemeriksaan / Pembersihan filter udara					
14	Pemeriksaan charger baterai					
17	Pembuangan solar pada filter					
18	Pembuangan air pada tanki solar					
19	Pemeriksaan konsentrasi coolant					
20	Pemeriksaan tegangan belt					
21	Pemeriksaan Baterai					
22	Penggantian oli dan Filter					
23	Penggantian Filter udara					
24	Pemeriksaan selang radiator					
25	Penggantian filter solar					
26	Pemeriksaan Sistem pendingin					

ISSN No:-2456-2165

➢ *Determination of Plan SOP*

Based on the results of the questionnaire, generator maintenance requirements and based on the manual from the generator engine manufacturer dealer, an operational standard can be developed that can be used as a reference in carrying out generator maintenance and maintenance activities.

In this study the authors limited the preparation of SOPs to the determination of SOPs, because for the next stage, namely SOP simulation, SOP evaluation, SOP approval and SOP socialization, it can only be carried out in the object of the building, namely the Hotel and Office Building MG Setos Semarang.

The following is the result of the SOP plan that has been made based on the results of the questionnaire, maintenance requirements, and the genset manual.

<table>
<tr><td>MG SETOS HOTEL SEMARANG ★★★★</td><td colspan="3">PERAWATAN DAN PEMELIHARAAN
MESIN GENERATOR SET</td></tr>
<tr><td rowspan="2">HOTEL & OFFICE
BUILDIING MG
SETOS SEMARANG</td><td>No Dokumen</td><td>No Revisi</td><td>Halaman</td></tr>
<tr><td>Tanggal Terbit</td><td colspan="2">Ditetapkan oleh :
GM Hotel MG Setos Semarang

Wuryanto, S.E., M.Par.</td></tr>
<tr><td>STANDAR
OPERASIONAL
PROSEDUR</td><td colspan="3"></td></tr>
<tr><td>PENGERTIAN</td><td colspan="3">Genset atau yang biasa disebut Generator Set adalah salah satu peralatan gabungan dari dua perangkat yang berbeda yaitu Engine dan Generator (Alternator)</td></tr>
<tr><td>TUJUAN</td><td colspan="3">Untuk menjelaskan tentang cara perawatan dan pemeliharaan ruang Genset agar ruangan Genset tetap dalam kondisi baik dan mampu memberikan suport terhadap kinerja Generator Set</td></tr>
<tr><td>PROSEDUR</td><td colspan="3">1. Perawatan dan pemeliharaan Genset <u>hanya diijinkan</u> dilaksanakan oleh <u>Staff Engineering</u> Hotel & Office Building MG Setos Semarang
2. Kunci ruangan Genset hanya dapat diakses oleh Staff Engineering Hotel & Office Building MG Setos Semarang
3. Pengecekan genset dilakukan sesuai jadwal pemeliharaan
4. Sebelum kegiatan perawatan dan pemeliharaan genset dilaksanakan, Staff Wajib mengenakan alat pelindung diri :
a. Safety Shoes c. Seragam Kerja
b. Celana panjang d. Sarung tangan
5. Pengecekan genset meliputi :
a. Pengecekan sambungan (Konektivitas) baterai
b. Pengecekan Level Oli Mesin
c. Pengecekan Level Cairan Pendingin mesin
d. Pengecekan sistem bahan bakar
e. pengecekan sistem pembuangan
f. pengecekan sistem mekanis udara
g. pengecekan belt mesin</td></tr>
</table>

Fig 1 SOP Plan

HOTEL & OFFICE BUILDIING MG SETOS SEMARANG	PERAWATAN DAN PEMELIHARAAN MESIN GENERATOR SET		
	No Dokumen	No Revisi	Halaman
STANDAR OPERASIONAL PROSEDUR	Tanggal Terbit	Ditetapkan oleh : GM Hotel MG Setos Semarang Wuryanto, S.E., M.Par.	
PENGERTIAN	Genset atau yang biasa disebut *Generator Set* adalah salah satu peralatan gabungan dari dua perangkat yang berbeda yaitu *Engine* dan *Generator (Alternator)*		
TUJUAN	Untuk menjelaskan tentang cara perawatan dan pemeliharaan ruang Genset agar ruangan Genset tetap dalam kondisi baik dan mampu memberikan suport terhadap kinerja Generator Set		
PROSEDUR	A. Perawatan baterai Genset membutuhkan baterai untuk memberi daya pada rangkaian starternya. ➢ Periksa sambungan terminal baterai, sambungan **harus kencang** untuk menghindari hambatan listrik yang membuat starter lebih sulit. ➢ Periksa wadah baterai dan bracket, wadah dan bracket **harus tetap dalam keadaan kering** ➢ Mengisi **form MG 01** pengecekan baterai B. Perawatan Sistem Pelumasan Jauhkan kotoran, air, dan kontaminasi lainnya yang dapat masuk kedalam saluran lubrikasi yang berpotensi menyumbat. B.1 Pengecekan Oli Mesin ➢ Buka katup indicator (Dipstick) oli mesin ➢ **Bersihkan** indicator dengan lap ➢ Masukan dan keluarkan lagi, periksa kapasitas dan keadaan oli ➢ Mengisi **form MG 02** pengecekan oli		

HOTEL & OFFICE BUILDIING MG SETOS SEMARANG	PERAWATAN DAN PEMELIHARAAN MESIN GENERATOR SET		
	No Dokumen	No Revisi	Halaman
STANDAR OPERASIONAL PROSEDUR	Tanggal Terbit	Ditetapkan oleh : GM Hotel MG Setos Semarang Wuryanto, S.E., M.Par.	
PENGERTIAN	Genset atau yang biasa disebut *Generator Set* adalah salah satu peralatan gabungan dari dua perangkat yang berbeda yaitu *Engine* dan *Generator (Alternator)*		
TUJUAN	Untuk menjelaskan tentang cara perawatan dan pemeliharaan ruang Genset agar ruangan Genset tetap dalam kondisi baik dan mampu memberikan suport terhadap kinerja Generator Set		
PROSEDUR	B.2 Penggantian Oli Mesin dan Filter ➢ Jalankan genset hingga hangat kemudian matikan ➢ Letakkan penampung oli pada katup pembuangan oli ➢ Buka katup pengisian oli ➢ Buka katup pembuangan ➢ Pisahkan filter oli dan tiriskan ➢ Lepasakan filter bekas dan bersihkan ➢ Pasangkan filter baru dan kencangkan ➢ Pasang kembali katup pembuangan ➢ Isi ulang dengan oli, periksa level oli ➢ Pasang tutup pengisian oli ➢ Buang oli bekas sesuai dengan peraturan lingkungan setempat		

MG SETOS HOTEL SEMARANG ★★★★	PERAWATAN DAN PEMELIHARAAN MEISN GENERATOR SET		
HOTEL & OFFICE BUILDIING MG SETOS SEMARANG	No Dokumen	No Revisi	Halaman
STANDAR OPERASIONAL PROSEDUR	Tanggal Terbit	Ditetapkan oleh : GM Hotel MG Setos Semarang Wuryanto, S.E., M.Par.	
PENGERTIAN	Genset atau yang biasa disebut *Generator Set* adalah salah satu peralatan gabungan dari dua perangkat yang berbeda yaitu *Engine* dan *Generator (Alternator)*		
TUJUAN	Untuk menjelaskan tentang cara perawatan dan pemeliharaan ruang Genset agar ruangan Genset tetap dalam kondisi baik dan mampu memberikan suport terhadap kinerja Generator Set		
PROSEDUR	C. Perawatan Sistem Pendingin Mesin (Coolant) Pengecekan level pendingin mesin ➢ Periksa Level pendingin mesin ➢ Isi ulang apabila cairan pendingin **berkurang** ➢ Gunakan cairan pendingin **sesuai rekomendasi** mesin ➢ Mengisi **form MG 03** pengecekan level pendingin mesin D. Perawatan Sistem Bahan Bakar D.1 Pengecekan Sistem Solar ➢ Periksa pipa-pipa suplai bahan bakar ➢ Periksa tangki harian bahan bakar ➢ Mengisi **orm MG 04** Pengecekan sistem bahan bakar D.2 Penggantian Filter bahan bakar (Solar) ➢ Cabut terminal negatif (-) pada baterai ➢ Lepas saluran bahan bakar, gunakan kunci inggris ➢ Tutup saluran bahan bakar agar tidak terjadi kebocoran ➢ Lepaskan filter bahan bakar bekas ➢ Pasangkan filter bahan bakar baru ➢ Pasang kembali saluran bahan bakar ➢ Hubunngkan kembali terminal negatif (-) pada baterai ➢ Buang filter bekas sesuai dengan peraturan lingkungan setempat		

MG SETOS HOTEL SEMARANG ★★★★	PERAWATAN DAN PEMELIHARAAN MEISN GENERATOR SET		
HOTEL & OFFICE BUILDIING MG SETOS SEMARANG	No Dokumen	No Revisi	Halaman
STANDAR OPERASIONAL PROSEDUR	Tanggal Terbit	Ditetapkan oleh : GM Hotel MG Setos Semarang Wuryanto, S.E., M.Par.	
PENGERTIAN	Genset atau yang biasa disebut *Generator Set* adalah salah satu peralatan gabungan dari dua perangkat yang berbeda yaitu *Engine* dan *Generator (Alternator)*		
TUJUAN	Untuk menjelaskan tentang cara perawatan dan pemeliharaan ruang Genset agar ruangan Genset tetap dalam kondisi baik dan mampu memberikan suport terhadap kinerja Generator Set		
PROSEDUR	E. Perawatan Sistem Pembuangan ➢ Cari dan periksa kebocoran sistem pembuangan pada saat genset bekerja ➢ Matikan genset jika ditemukan **kebocoran** dan perbaiki sebelum dioperasikan ➢ Gunakan masker pelindung pernafasan ➢ Mengisi **form MG 05** pengecekan system pembuangan F. Perawatan Sistem Mekanis Udara F.1 Pengecekan Sistem Udara ➢ Cari kerusakan mekanis , dengarkan suara dan getaran yang tidak biasa ➢ Pastikan lubang masuk udara genset tidak tersumbat atau terhalang kotoran ➢ Bersihkan debu dan kotoran yang terkumpul dari genset ➢ Jangan membersihkan genset saat sedang beroperasi ➢ Lindungi genset, filter udara, sambungan listrik, dari air dan sabun atau larutan pembersih ➢ Mengisi **form MG 06** pengecekan sistem udara		

	PERAWATAN DAN PEMELIHARAAN MESIN GENERATOR SET		
HOTEL & OFFICE BUILDIING MG SETOS SEMARANG	No Dokumen	No Revisi	Halaman
STANDAR OPERASIONAL PROSEDUR	Tanggal Terbit	Ditetapkan oleh : GM Hotel MG Setos Semarang Wuryanto, S.E., M.Par.	
PENGERTIAN	Genset atau yang biasa disebut *Generator Set* adalah salah satu peralatan gabungan dari dua perangkat yang berbeda yaitu *Engine* dan *Generator (Alternator)*		
TUJUAN	Untuk menjelaskan tentang cara perawatan dan pemeliharaan ruang Genset agar ruangan Genset tetap dalam kondisi baik dan mampu memberikan suport terhadap kinerja Generator Set		
PROSEDUR	F.2 Penggantian Filter Udara ➢ Lepaskan bracket filter udara ➢ Lepaskan filter udara ➢ Pasangkan filter udara baru ➢ Pasang kembali bracket filter udara ➢ Pastikan kencang dan rapat G. Pengecekan Belt Mesin ➢ Periksa tingkat ketegangan belt ➢ Pastikan belt dengan ketegangan normal tidak kencang dan tidak kendur ➢ Pastikan belt dalam keadaan baik , tidak getas dan kaku ➢ Pastikan belt elastis ➢ Mengisi **form MG 07** pengecekan belt		

	JADWAL PERAWATAN DAN PEMELIHARAAN GENERATOR SET		
HOTEL & OFFICE BUILDIING MG SETOS SEMARANG	No Dokumen	No Revisi	Halaman
STANDAR OPERASIONAL PROSEDUR	Tanggal Terbit	Ditetapkan oleh : GM Hotel MG Setos Semarang Wuryanto, S.E., M.Par.	

No	Jenis Perawatan	Waktu Service				
		Harian	Mingguan	Bulanan	6 Bulan	Tahunan
1	Inspeksi	✓				
2	Pemeriksaan Kebersihan Ruang Generator	✓				
3	Pemeriksaan Fasilitas Ruang Generator	✓				
4	Pemeriksaan Kebersihan Ruang Panel	✓				
5	Pemeriksaan Fasilitas Ruang Panel	✓				
6	Pemeriksaan Kebersihan Ruang Tanki Bahan Bakar	✓				
7	Pemeriksaan Fasilitas Ruang Tanki Bahan Bakar	✓				
8	Pemeriksaan Level Coolant	✓				
9	Pemeriksaan Level oli	✓				
10	Pemeriksaan Level solar	✓				
11	Pemeriksaan saluran udara	✓				
13	Pemeriksaan / Pembersihan filter udara		✓			
14	Pemeriksaan charger baterai		✓			
17	Pembuangan solar pada filter		✓			
18	Pembuangan air pada tanki solar		✓			
19	Pemeriksaan konsentrasi coolant			✓		
20	Pemeriksaan tegangan belt			✓		
21	Pemeriksaan Baterai			✓		
22	Penggantian oli dan Filter				✓	
23	Penggantian Filter udara				✓	
24	Pemeriksaan selang radiator				✓	
25	Penggantian filter solar				✓	
26	Pemeriksaan Sistem pendingin					✓

Fig 2 Maintenance Scheduling

➢ *Maintenance Costs*

Maintenance and maintenance of generator sets in hotels has an important role in maintaining the condition of generators so that they work optimally so that activities that take place at the MG Setos Semarang hotel can run properly without any problems related to electricity. To realize a good generator set condition, proper care and maintenance is required. So that it is necessary to plan the maintenance and maintenance budget that is arranged effectively and efficiently.

- *Inspection Fee*

Inspection is a mandatory activity for engineering officers so that the costs required for inspection activities are included in the monthly salary of engineering officers. In this study the authors did not take into account the monthly salaries of engineering officers because the scope of work carried out by the engineering department was not only generator maintenance but other activities.

- *Spare Part Replacement Costs*

The cost of replacing spare parts is calculated from the components that can be replaced in the event of damage. Replacement costs usually include the components replaced and the cost of disassembling by the relevant officers.

The following components are replaced according to the maintenance schedule:

Table 2 Components for Replacement of Spare Parts

No	Component	Frequency	Quantity	Price (IDR)	Technician Service Fee (IDR)	Amount (IDR)
1	Solar Filters	6 months	8 Units	250.000,-	300.000,-	4.300.000,-
2	Oil Filters	6 months	8 Units	65.000,-	300.000,-	1.340.000,-
3	Air Filter	6 months	2 Units	400.000,-	300.000,-	1.900.000,-
4	Check Coolant and add Coolant	Monthly	9,3L x 2 Units	27.000,-	300.000,-	6.326.400,-
Amount						13.866.400,-

- *Cost of Supporting Facilities*

The cost of the need for supporting facilities is the cost used to maintain or replace the supporting facilities for the generator room, panel room, and fuel tank room.

The following is the cost of replacing or maintaining the components of supporting facilities:

Table 3 Components of the Need for Supporting Facilities

No	Component	Frequency	Quantity	Price (IDR)	Amount (IDR)
1	Broom	6 months	1 x 3 Room	30.000,-	180.000,-
2	dustpan	1 year	1 x 3 Room	25.000,-	75.000,-
3	duster	6 months	1 x 3 Room	15.000,-	90.000,-
4	Vacuum Cleaner	1 year	1 x 1 Room	600.000,-	600.000,-
5	Sky Sweep	6 months	1 x 3 Room	40.000,-	240.000,-
6	Fluorescent lamps	1 tahun	6 x 3 Room	95.000,-	1.710.000,-
7	fire extinguisher	3 months	1 x 3 Room	300.000,-	3.600.000,-
8	Wipe Cloth	3 months	1 x 1 Room	15.000,-	60.000,-
9	Ear protector	1 year	1 x 1 Room	60.000,-	60.000,-
10	Respirator Mask	1 year	1 x 1 Room	40.000,-	40.000,-
				Amount	6.665.000,-

Based on the maintenance costs above, the overall cost of maintaining the generator set per year is as follows:

✓ *Sparepart replacement costs: Rp. 13,866,400,-*
✓ *Cost of supporting facilities: Rp. 6,665,000,-*
✓ *Amount : Rp. 20,531,400,-*

IV. CONCLUSION

Based on the results of the analysis and discussion, the following conclusions can be drawn:

- Maintenance and maintenance of the generator set is an activity that must be carried out by the engineering department of Hotel MG Setos Semarang in order to maintain the performance and reliability of the generator set so that it can always supply backup electricity when there is no electricity supply from PLN.
- To carry out the maintenance and maintenance of generator sets, a regulation is needed to serve as a reference for caring for and maintaining generator sets. The role of SOP in genset maintenance and maintenance activities is very important so that procedural errors do not occur which can result in damage to the machine or work accidents.
- From the analysis of care and maintenance management of the MG Setos Hotel Engineering Department and Office Building Mg Setos Semarang and several technical problems, namely the frequent occurrence of delays in starting generators, the preparation of this SOP is the right solution so that the maintenance and

maintenance process can be controlled, scheduled and running in an orderly manner. effective.

- Based on routine scheduling and budget plans, it is possible to know the operational costs of maintenance and maintenance of generator sets for one year. For the Hotel MG Setos and Office Building Mg Setos Semarang, a fund of Rp. 20,531,400,-for generator set maintenance and repair.

THANK-YOU NOTE

The authors would like to thank the Department of Civil Engineering, Semarang State Polytechnic and the Management of the Gets Hotel Semarang Building who assisted in supporting the smooth running of this research.

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