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PREVENTIVE MAINTENANCE OF THE GATE VALVE MOV 30, UNIT 7, AT PT. INDONESIA POWER SURALAYA PGU

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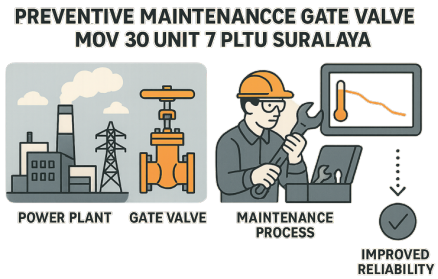
Graphical abstract



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Abstract

One of the critical components in the power generation process at the Suralaya PGU PLTU is the Gate Valve. The MOV 30 Gate Valve plays a vital role in regulating the flow of steam gas from the extraction steam to the blowdown tank. Preventive maintenance on the MOV 30 Gate Valve, unit 7, is essential to avert potential damage, minimize the risk of failure, and ensure optimal operational efficiency. Through diligent preventive maintenance, PT Indonesia Power aims to prevent disruptions in power generation, reduce downtime, and extend the operational lifespan of its equipment. Various factors can lead to damage to a gate valve, including excessive pressure within the valve flow, elevated temperatures passing through the valve, and friction encountered during the opening and closing of the valve.
Keywords: Preventive Maintenance, Gate Valve, Seats

Abstrak

Salah satu komponen krusial dalam proses pembangkitan daya di PLTU PGU Suralaya adalah Gate Valve. Gate Valve MOV 30 berperan vital dalam mengatur aliran gas uap dari uap ekstraksi ke blowdown tank. Perawatan preventif pada Gate Valve MOV 30 unit 7 sangat penting untuk mencegah potensi kerusakan, meminimalkan risiko kegagalan, dan memastikan efisiensi operasional yang optimal. Melalui perawatan preventif yang tekun, PT Indonesia Power bertujuan untuk mencegah gangguan dalam pembangkitan daya, mengurangi downtime, dan memperpanjang umur operasional peralatannya. Berbagai faktor dapat menyebabkan kerusakan pada gate valve, antara lain tekanan berlebih dalam aliran katup, tingginya temperatur yang melewati katup, dan gesekan yang terjadi saat katup dibuka dan ditutup.

Kata kunci: Perawatan Preventif, Gate Valve, Seats

1.0 PENDAHULUAN

PT Indonesia Power is a prominent power generation company in Indonesia. One of its key facilities is the PLTU Suralaya PGU, located in the Suralaya area of Banten, which has a total electricity generation capacity of 3,400 MW.

A crucial component in the power generation process at PLTU Suralaya PGU is the Gate Valve MOV 30 unit 7. This control valve regulates the flow of fluid or gas within the generation system, playing an essential role in maintaining both the stability and efficiency of the generating unit's operations. To ensure optimal performance and reliability, preventive maintenance is routinely conducted. The preventive maintenance of Gate Valve MOV 30 unit 7 aims to avert unwanted damage, minimize the risk of failure, and guarantee that the device operates at maximum efficiency.

Through diligent preventive maintenance, PT Indonesia Power aims to prevent disruptions in generating operations, reduce downtime, and extend the operational lifespan of the unit. This report enables PT Indonesia Power to identify potential issues with Gate Valve MOV 30 unit 7, thereby enhancing overall system performance and ensuring that the PLTU Suralaya PGU continues to operate efficiently, delivering a stable electricity supply.

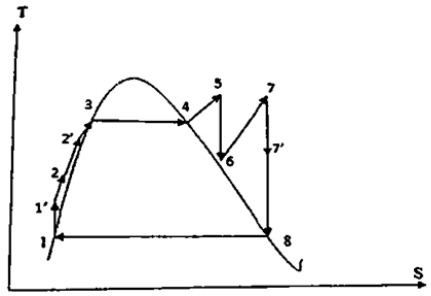

Figure 1. The actual Rankine cycle in a steam power plant

Figure explanation:

a. Process 1-1':
   The increase in water pressure is caused by the Condensate Extraction Pump (CEP).
b. Process 1'-2 :
   Water is heated in Low-Pressure Heater 1-3
c. Process 2-2' :
   The pressure is increased again in this process using the Boiler Feed Pump (BFP).
d. Process 2'-3 :
   Water is heated in High-Pressure Heater 4-6, and again in the economizer.
e. Process 3-4 :
   Water is converted into steam in the wall tube and downcomer in the boiler.
f. Process 4-5 :
   The steam is further heated into superheated steam in the superheater.
g. Proses 5-6 :
   Steam expands in the High-Pressure Turbine.
h. Process 6-7:
   The steam exiting the High-Pressure Turbine is reheated in the reheater.
i. Process 7-7' :
   Steam expanding from the reheater moves through the Intermediate Pressure Turbine.
j. Process 7'-8 :
   Steam expands in the Low-Pressure Turbine without reheating.
k. Process 8-1 :
   The steam is cooled back into water in the condenser.

A valve is a device used to control the flow of fluids, which can be in the form of gas, liquid, or other semi-fluids. Maintenance encompasses all actions taken to keep a machine or production tool in good working order or to repair it until it reaches an acceptable condition.

Preventive maintenance is performed at predetermined intervals or according to specified criteria to reduce the likelihood of other components failing to meet acceptable standards.

2.0 RESEARCH METHODOLOGY

Preventive maintenance refers to the planned and routine upkeep of equipment. The procedure is as follows:

a) The Maintenance Manager develops a maintenance plan by assessing the equipment that requires maintenance, utilizing the FM-SLA/018 Annual Maintenance Plan Form.
b) Following this, the Maintenance Manager creates an implementation schedule that outlines the scope of work, labor requirements, materials and spare parts, necessary tools, and safety equipment. Additionally, potential hazards and possible environmental impacts are identified.
c) The Maintenance SPS is tasked with executing the field activities.
d) The maintenance implementation aligns with the work instructions or job plan in Maximo and involves continuous coordination with the Operation SP or the operator.

Identification of Disturbances

Generally, disturbances in this extraction system may manifest as jamming (blockages), the opening or closing of the drain valve, MOV, or NRV. Such conditions can often be anticipated through regular checks of the NRV.

Common Issues with the Gate Valve

1) Valve Leak (Leaking/Loose)
   If the valve is not functioning properly, there is a significant likelihood of leakage. This leak usually occurs at the packing gland, which can often be rectified by tightening the gland nut. However, this tightening may lead to increased friction between

the packing and the stem, making the handwheel more difficult to operate. In addition to the packing gland, leaks may also arise in other areas, such as body and bonnet joints, the body itself, and around the flange.

2) Physical Damage
A valve that is malfunctioning may also be a result of physical damage. Therefore, conducting a thorough visual inspection is essential before proceeding with any additional treatment.

3) Lubrication
Proper lubrication of the valve, particularly the stem, is critical for ensuring the valve's longevity and optimal performance.

3.0 RESULTS AND DISCUSSION

Before proceeding with repairs, it is essential to identify the issues present and determine the type of valve involved in order to outline the appropriate repair steps. The preventive maintenance steps performed on the valve at Suralaya PLTU Unit 7 include:

1. Inspecting the condition of the gate valve to check for any leaks or damage.
2. Regularly cleaning the valve to prevent dirt or rust buildup, which could hinder performance.
3. Ensuring that all valve components move smoothly and applying lubrication as needed.
4. Conducting periodic function tests on the valve to verify optimal performance.
5. Recording data on the inlet and outlet temperatures of the drain valve.

Table 1. Record temperature in & out drain valve

Equipment	Unit	In	Out
Extr. Steam to Blow Down Tank			
1. SB-MOV-29&30	°C	533	175
2. SB-MOV-33&34	°C	534	45
3. SB-MOV-46&47	°C	502	247
4. SB-MOV-155&156	°C	506	255
5. SB-MOV-61&62	°C	506	45
6. SB-MOV-135	°C	528	194
7. SB-MOV-131	°C	484	339
Extr. Steam to LP/HP, HTR and DEA			
1. Extraction to HP.HRT.8			
SE-V-0066	°C	388	43
SE-V-0065	°C	388	48
2. Extraction to HP.HTR.6			
SE-V-0060	°C	433	34
SE-V-0059	°C	433	36
3. Extraction to LP.HTR.4			
SE-V-0024	°C	249	63
SE-V-0023	°C	249	40
4. Extraction to LP.HTR.2			
SE-V-0005	°C	95	39
SE-V-0006	°C	95	40
SE-V-0012	°C	58	32
SE-V-0011	°C	58	33
5. Extraction to LP.HTR.3			
SE-V-0017	°C	101	41
SE-V-0018	°C	101	39
6. Extraction to DEA&BFPT			
SE-V-0039	°C	344	41
SE-V-0035	°C	344	43
SE-V-0036	°C	344	46
SE-V-0042	°C	344	43
SE-V-0048	°C	344	68
SE-V-0045	°C	344	41
SE-V-0051	°C	344	46
SE-V-0054	°C	344	37

The Table 1 displays the data record for the in and out temperatures of the Drain Valve in 2022. It shows that the incoming temperature at the MOV 30 valve is 533°C, while the outgoing temperature is 173°C. Typically, when a gate valve is closed, the temperature passing through it should be minimal. However, during the inspection, it was found that the released temperature was below 60°C, indicating that an overhaul was necessary for repairs.

Figure 2 showed an example of a seat from the MOV 30 gate valve that was opened during the overhaul process.

Figure 2. Gate valve MOV 30

The red paint used for leak detection serves to verify the effectiveness of the lapping process on the valve seat and disc. An overhaul was performed because the valve was functioning abnormally, showing signs of excessive steam leakage.

4.0 CONCLUSION

After conducting practical work, the author reached several conclusions, which are outlined below:

1. A valve is a mechanical component used to control, direct, or regulate the flow of fluids (liquids or gases) in a piping system. Valve MOV 30 specifically regulates the flow of steam gas from the extraction steam to the blow-down tank.
2. Preventive maintenance on the gate valve is beneficial in the long run, as various factors can damage specific components within the valve.

Regular maintenance helps to maintain the valve's efficiency and extend its service life.

3. Damage to a gate valve can be caused by several factors, including excessive pressure within the valve, high temperatures passing through it, and friction during the opening and closing processes.

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