

Steam Turbine Lifetime Assessment

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Abstract

Star Energy Geothermal Salak (SEGS) is one of the biggest a geothermal company in Indonesia. SEGS operates three typical 65.6 MW Geothermal Steam Turbine. It has been in operation for 20 years. As per industrial standard, the requirement states that the steam turbine is designed for 20 years. Based on OEM experience, it can be operated for 25-30 years and no specific number of information is provided, since each site is specific depending on the steam condition. To maximize operational lifetime and find out opportunity to prolong the lifetime the steam turbine, lifetime assessment (LTA) is conducted. Assessment was conducted with one of steam turbine during unit in major overhaul. And it will be conducted for the others on the next their major overhaul

Based on Salak geothermal environmental, steam condition and operating behavior, the assessment focus on corrosion, erosion or any crack indication on stationary blade, rotor and casing. The dominant failure mechanism on geothermal steam turbine is totally different to fossil fuel steam turbine. Fossil fuel steam turbine failure type is triggered by thermal deterioration, while geothermal steam turbine type is triggered by erosion.

The geothermal steam turbine lifetime assessments were conducted by using visual, dye penetrant, magnetic particle inspection, ultrasonic testing phase array and wastage measurement for determining the erosion rate. From the assessment, it was concluded that the dominant factor for LTA is the erosion on blade groove area of stationary blade and rotor. It was predicted that the erosion would exceed design limit within next 5 years. This condition can lead to blade looseness and eventually trigger catastrophic failure. Original Equipment Manufacturer (OEM) recommended to replace the turbine. SEGS team plan to develop the alternatives to repair the erosion.