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Diagnosis and Resolution of Intermittent High Vibration Spikes at Exhaust Bearing of Mitsubishi H-25 Gas Turbine using Shaft Vibration Analysis and Detailed Root Cause Analysis

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Abstract : This paper provides detailed study on the diagnosis of intermittent high vibration spikes at exhaust bearing (Non-Drive End) of Mitsubishi H-25 gas turbine installed in a petrochemical plant in Pakistan. The diagnosis is followed by successful root cause analysis of the issue and recommendations for improving the reliability of machine. Engro Polymer and Chemicals (EPCL), a Chlor Vinyl complex, has a captive power plant consisting of one combined cycle power plant (CCPP), having two gas turbines each having 25 MW capacity (make: Hitachi) and one extraction condensing steam turbine having 15 MW capacity (make: HTC). Besides, one 6.75 MW SGT-200 1S gas turbine (make: Alstom) is also available. In 2018, the organization faced an issue of intermittent high vibration at exhaust bearing of one of H-25 units having tag GT-2101 A, which eventually led to tripping of machine at configured securities. Since the machine had surpassed 64,000 running hours and major inspection was also due, so bearings inspection was performed. Inspection revealed excessive coke deposition at labyrinth where evidence of rotor rub was also present. Bearing clearance was also at upper limit, and slight babbitt (soft metal) chip off was observed at one of its pads so it was preventively replaced. The unit was restated successfully and exhibited no abnormality until October 2020, when these spikes reoccurred, leading to machine trip. Recurrence of the issue within two years indicated that root cause was not properly addressed, so this paper furthers the discussion on in-depth analysis of findings and establishes successful root cause analysis, which captured significant learnings both in terms of machine design deficiencies and gaps in operation & maintenance (O & M) regime. Lastly, revised O& M regime along with set of recommendations are proposed to avoid recurrence.

Keywords : exhaust side bearing, Gas turbine, rubbing, vibration
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