IRIS POWER CASE STUDY

CASE OF IPB VIBRATION MONITORED AFTER TWO WELD FAILURES

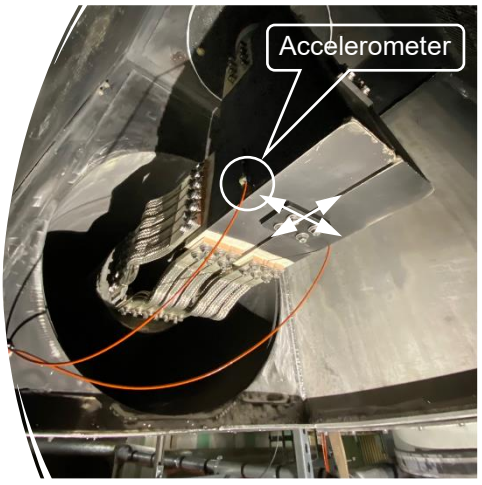
Company: Coal-fired Power Plant in Arkansas, U.S.A.
Machine: Unit 1, 25 kV 836 MW two-pole hydrogen-cooled generator in operation since 1983
Summary: Arc flash at welds on busbar adapter for flexible links at generator bushing

Background: In January 2025, an arc flash incident occurred inside the isophase busbar (IPB).

An inspection discovered that welds on the busbar adapters that bolt onto the generator bushings had failed.
Repairs were made and new busbar adapters patterned after the OEM design were used.
The new assemblies on the same phase failed after five weeks of operation.
With brand new welds having failed, a vibration problem was suspected.

After second failure in May 2025, a modal analysis was performed on generator and IPB components with original busbar adapters and the new design.

The modal testing showed that the busbar assemblies had a natural frequency around 120 Hz.
After installation, an overall deflection shape (ODS) analysis with video motion magnification was performed.
The vibration spectrum was dominated by the 1× rpm component, indicating a forced vibration mechanism rather than resonance.
No nearby structural natural frequencies were detected.



Vibration Monitoring and Findings: Two dual-axis EVAII optical fibre accelerometers were installed per phase to measure vibration in two orthogonal directions in the horizontal plane. The output was connected to a GuardII+ continuous monitor for long-term storage and trending.

The initial data confirmed that phase C of the IPB had higher vibration than the other two phases, see the yellow and light blue curves in the trend graph, Figure 1.
Vibration is predominantly at line frequency of 60 Hz, Figure 2, and the trend was approximately stable.

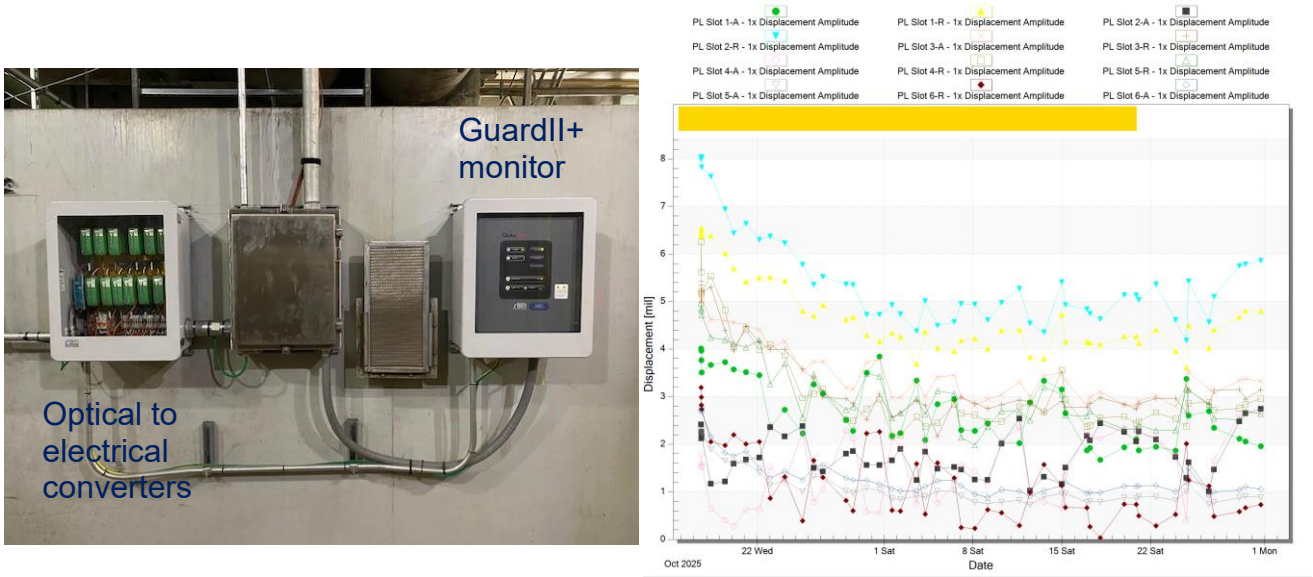


Figure 1 Short-term Trend Provided by Monitoring System

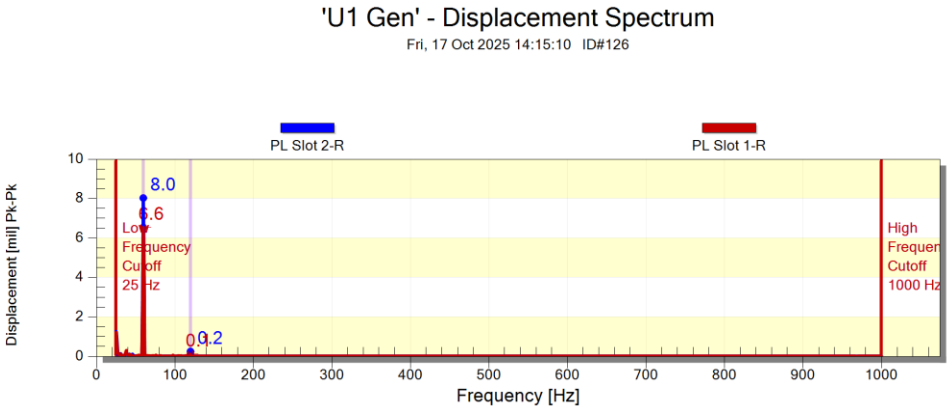


Figure 2 Spectrum Analysis of Vibration on Phase C IPB

Takeaway: In addition to mechanical issues such as shaft misalignment and bearing problems, improper foundation of electrical machines can cause vibration of connecting busbars, which in turn can lead to cracks, arcing and failure of the conductors. The root cause of the vibration will be further investigated when more data is collected.

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