

STATOR ENDWINDING VIBRATION IN HYDROGEN COOLED GENERATOR



Figure 1 – Dusting Between Felt Block and Stator End Cap

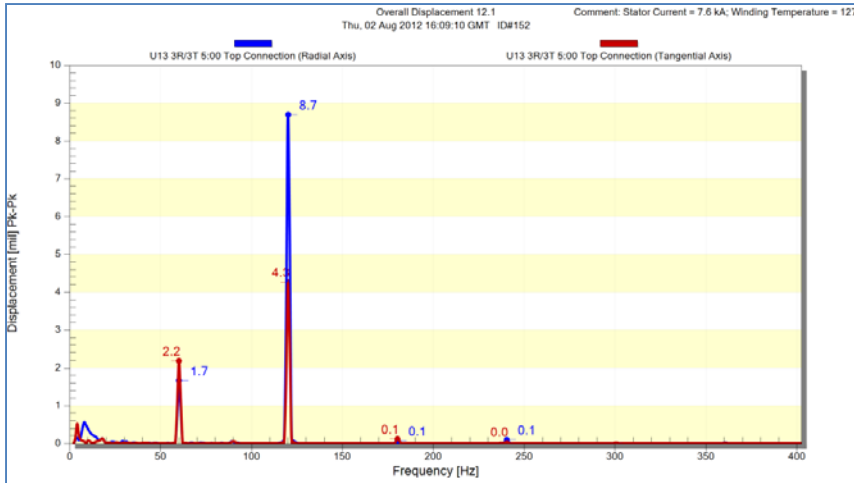


Figure 2 – Displacement Spectra

Company:

Midwest USA Utility

Ratings:

301.2MVA, 18kV, 2-pole, Hydrogen-cooled Generator

Details:

Nov-2011

- generator stator connection end endwinding structure reinforced
- IRIS Power EVA sensors installed

Aug-2012

- on-line stator endwinding vibration data collected showed 12.1mils (308µm) pk-pk overall in the radial direction (see Figure 2)
- there is no consensus regarding acceptable endwinding vibration levels, but displacement higher than 10mils (250µm) pk-pk overall is concerning

Oct-2012

- visual inspections showed dusting (See Figure 1) near one of the phase connections being monitored in the 5:00 position

Although dusting may not be cause for immediate concern it is an indication of the stator bars relative motion at their supports and insulation abrasion. Copper does not have a distinct fatigue limit but may eventually fail from small stress amplitudes due to high cycle fatigue. The generator failure can occur from phase to phase faults or broken conductors. The vibration signature indicated the onset of excessive movement and was confirmed visually. The excessive movement should be limited to prevent failure and the vibration should be monitored continuously to indicate any change to the endwinding support system.