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Test protocol #1/120523-001

Resonance frequency of a LPT 2nd stage blade check using high temperature strain gages

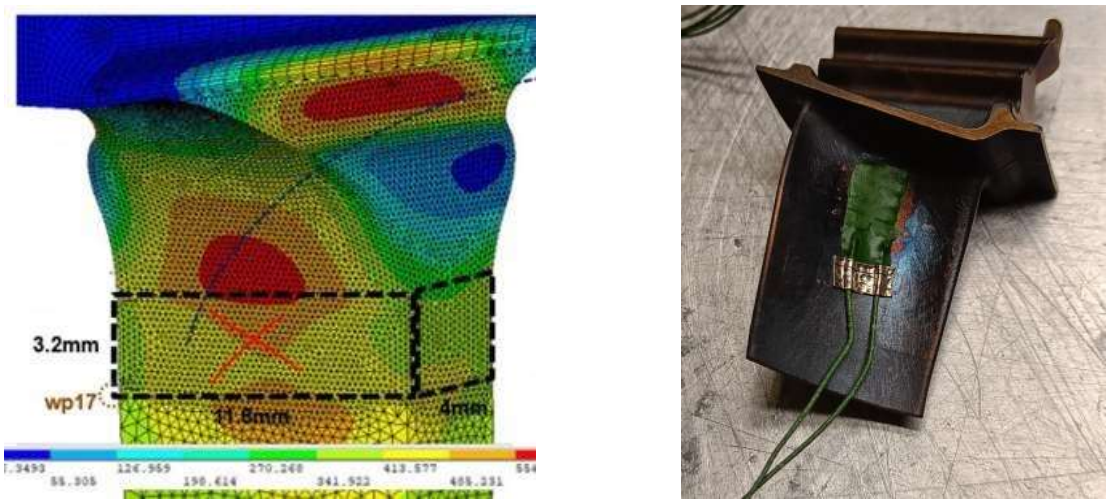
(extract)

Test date May 12, 2023

SG type: STN120-3.5AA-A900-N010-50

Strain gage installed with GT-900-H ceramic cement and CDWT-6001 welding tool on a LPT 2nd stage blade (installation scheme (a) and photograph (b) given below).

SG resistance including lead wires is 136.8 Ohm (nominal grid resistance is 120 Ohm).



a) b)

Figure 1. Installation of strain gage on the blade

The test is performed using vibrating test bench. Displacement of the blade edge is measured with HSV-2000 laser vibrometer system. Strain gage signal is collected with Siemens SCADAS Mobile DAQ system.

Resonance frequency is analyzed in 1.1 to 7.9 kHz range, with four expected peaks at 1587 Hz, 5168 Hz, 5912 Hz and 6197 Hz.

Graphs of test data are given in figures 2 and 3 below.

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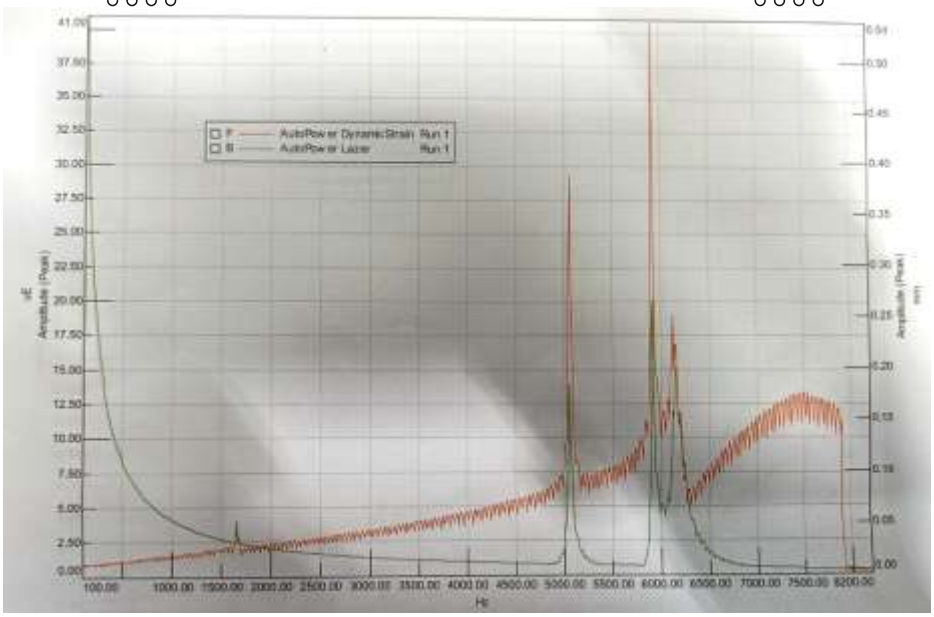

Figure 2. Test on vibrating bench, run 1

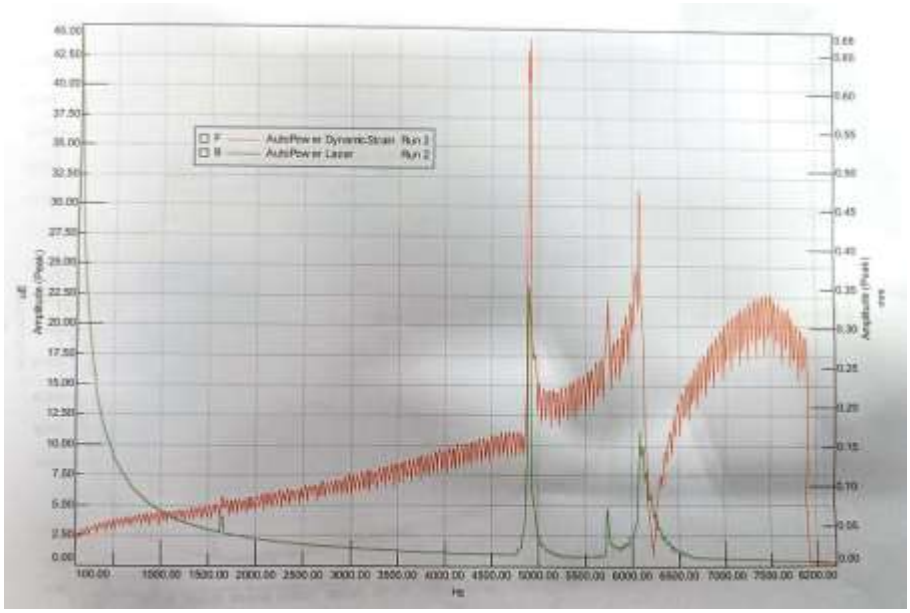

Figure 3. Test on vibrating bench, run 2

Test results. Strain gage signal peaks are clearly identified and are relevant to laser vibrometer readings. To assess the actual load on the blade in 0 to 45 με range, a preliminary calibration using HTDR-1001 static calibration rig and TFGD-4001 tuning fork graduation device is recommended.