SILO AC FAN NO.3 **Test 1 - (Dynamic) Run-Up / Waterfall plots (Power on)** **FAN NDE AXIAL** **BEFORE BASE MODS**

Rapid transient frequency spectra vibration capture during powered fan run up from 0-48.4 Hz (0-2905 RPM) Data collected from Fan DE Horiz, Fan NDE Vert, Fan NDE Axial *2140 Analyser used to collect data in 3 Channel transient mode with photo tach pulse.*

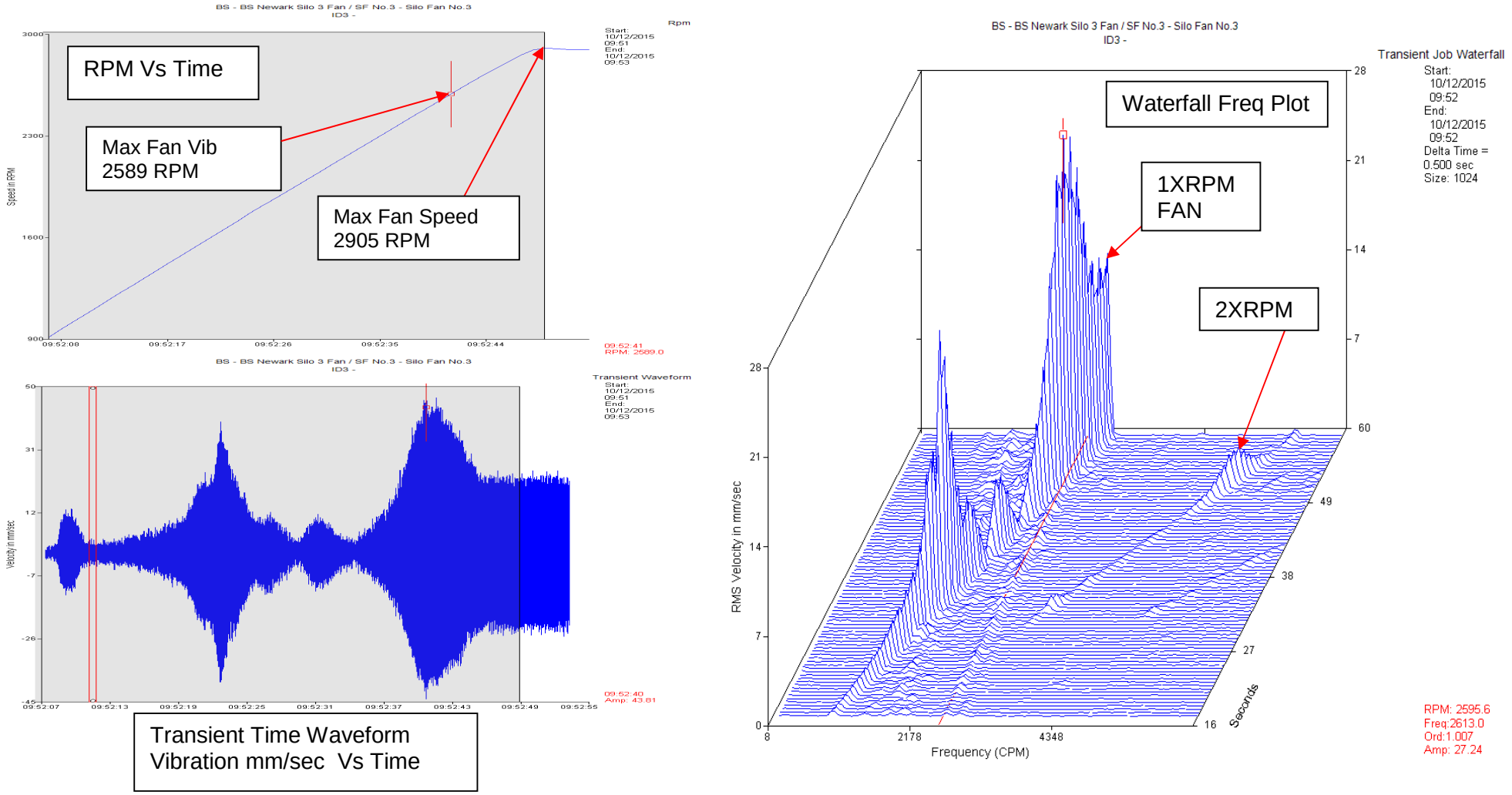


Fig 1 The above transient waveform & waterfall frequency plot shows an increase and decrease in vibration levels during the fan run up from 0- 2905 RPM **Max overall vibration recorded was 26 mm/sec RMS @ 2589 RPM in the Fan NDE axial direction.**

SILO AC FAN NO.3 **Test 2 - (Dynamic) Run-Up / Waterfall plots (Power on)** **FAN NDE AXIAL** **AFTER BASE MODS**

Rapid transient frequency spectra vibration capture during powered fan run up from 0-48.4 Hz (0-2905 RPM) Data collected from Fan DE Horiz, Fan NDE Vert, Fan NDE Axial *2140 Analyser used to collect data in 3 Channel transient mode with photo tach pulse.*

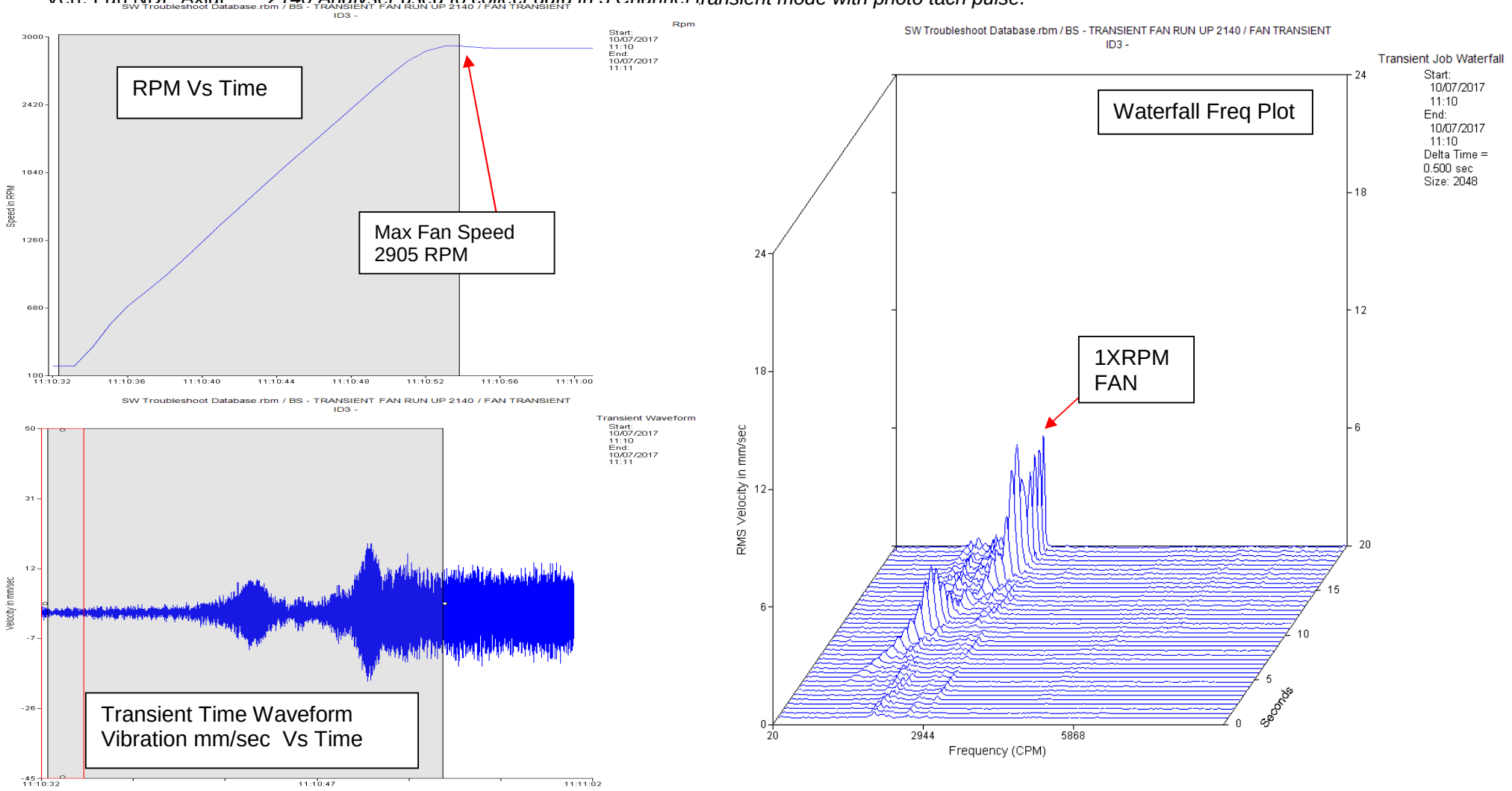


Fig 2 The above transient waveform & waterfall frequency plot post modification shows a significant reduction in overall vibration levels 0- 2905 RPM **Max overall vibration recorded was 6.4 mm/sec RMS. Levels have reduced by 77% after base modification.**

SILO AC FAN NO.3 Test 2 - (Dynamic) Coast-down / Peak / Phase (Power off)

Rapid transient frequency spectra vibration capture as the fan coasts down (no power) from 48.4 -0 Hz (2905-0 RPM) Data collected from Fan DE Horiz, Fan NDE Vert, Fan NDE Axial

2140 Analyser used to collect data in Peak / Phase mode with photo tach pulse.

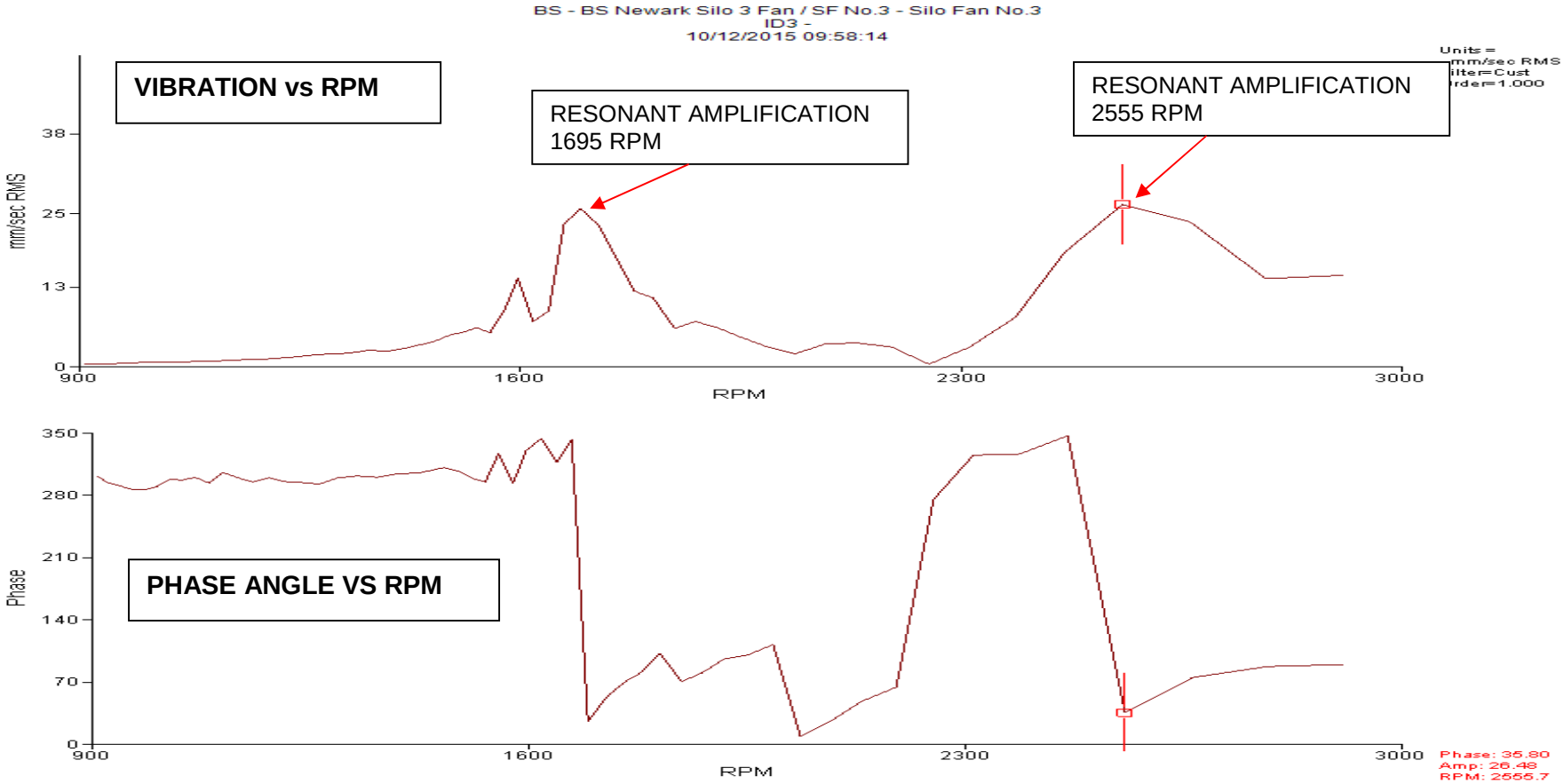


Fig 2 The above peak / phase vibration plots, clearly show as the fan coasted down the fan passed through to resonant frequencies where the structure was excited and amplified to unacceptable levels. Max vib was around **2555 RPM 26 mm/sec RMS** and another one occurred at **1695 RPM at 26 mm/sec RMS.** The fan vibration levels were acceptable between **1845 RPM – 2350 RPM**

Test 3 - (Static) Bump Tests fan structure Silo 3 Fan, Temporary stiffening of bearing unit.

Parts of the fan structure are impacted and the natural frequencys are recorded, this is done whilst the fan is not running.

2140 Analyser used to collect data in Bump Test machine off mode

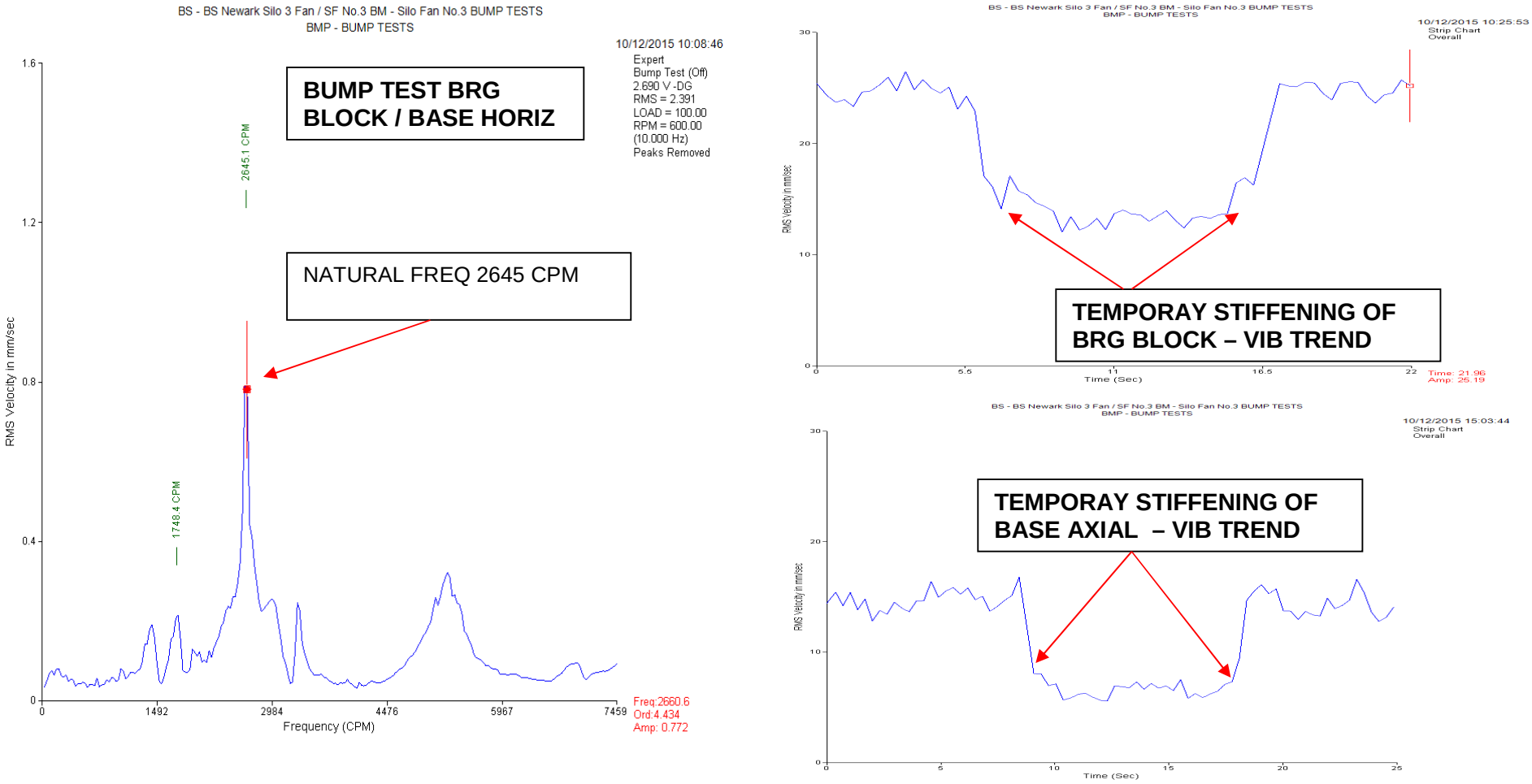
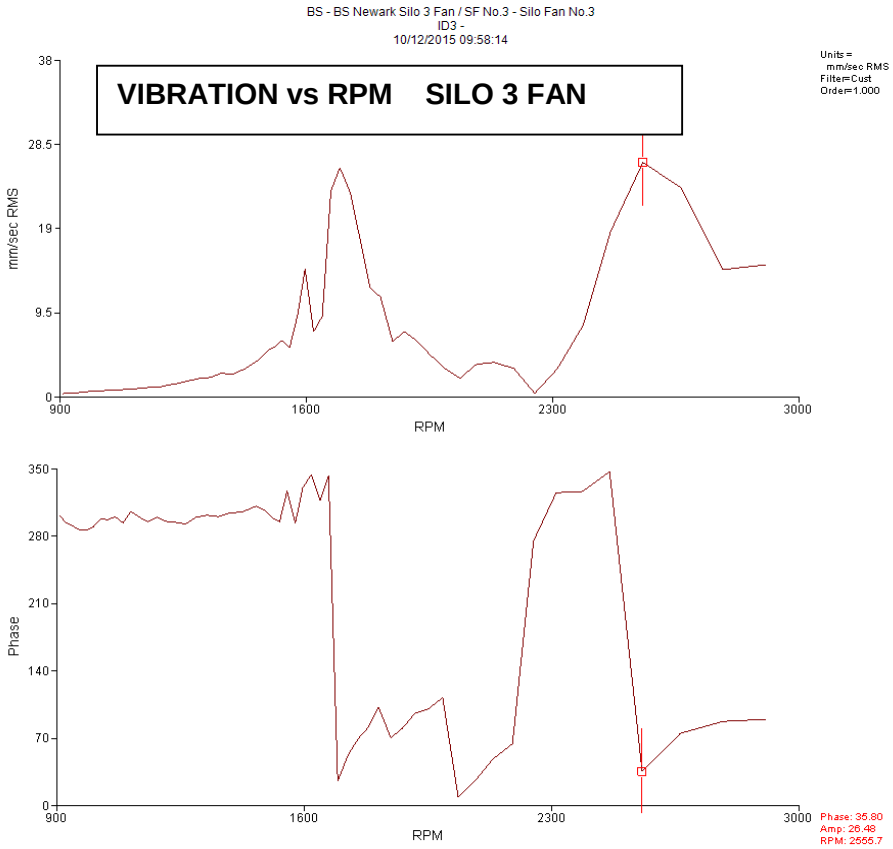


Fig 3 The above bump test showed a natural frequency of 2645 CPM & 1748 CPM are present on the bearing block/base, these frequencies are within the running speed range of the fan. The trend on the right shows that temporary stiffening of the brg block in the horizontal direction had a significant effect by reducing the vib by nearly around 40% this was done at 2500 RPM. A later test in the axial direction had a 60% reduction in vibration levels.

Test 4 - (Dynamic) Coast-down / Peak / Phase (Power off) Silo 2 Fan Comparision with Silo 3 Fan

Rapid transient frequency spectra vibration capture as the fan coasts down (no power) from 48.4 -0 Hz (2905-0 RPM) Data collected from Fan DE Horiz, Fan NDE Vert, Fan NDE Axial

2140 Analyser used to collect data in Peak / Phase mode with photo tach pulse.



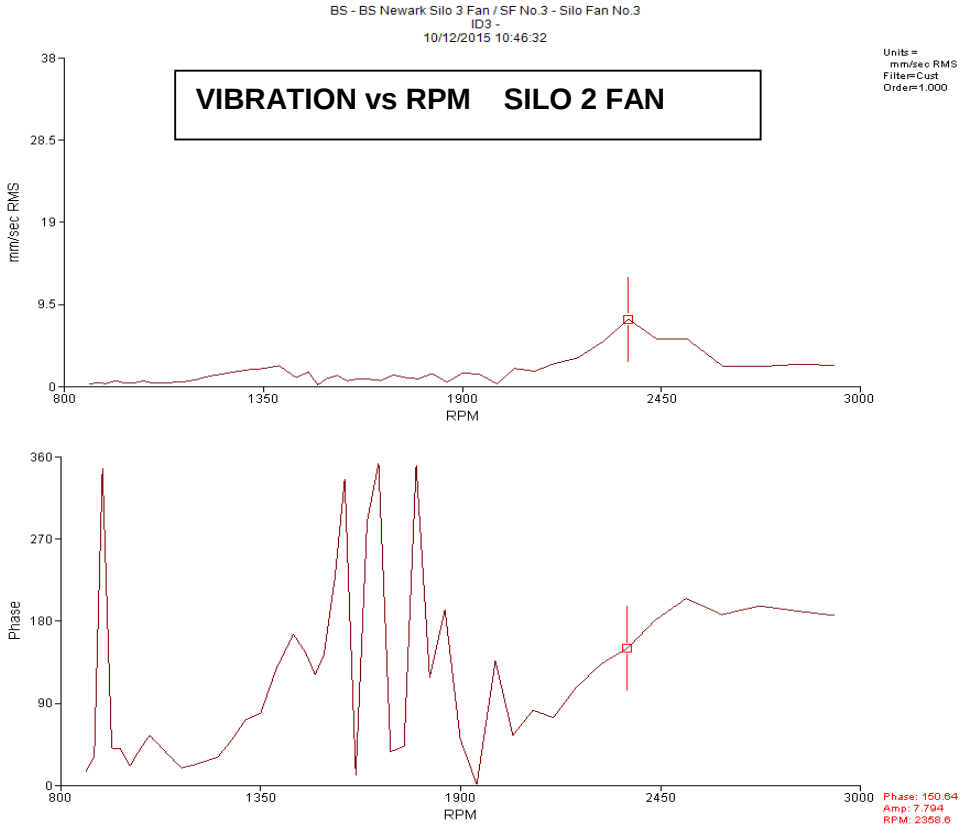


Fig 4 The above plots show comparison coast-downs between Silo No.3 fan and Silo No.2 fan. Note how No.3 Silo fan has significantly more amplification of the fan vibration levels as it passes through the natural frequencies. Silo No.2 Fan still shows a slight amplification at 2350 RPM but the levels are within limits. Silo Fan No.2 shows lower levels due to the forcing function 1XRPM unbalance is better.