Case History No.7

HIGH SPEED PUMP COUPLING IN-SITU BALANCE CORRECTION

P2152B is an electric motor driven boiler feed water pump coupled to a 2 shaft gearbox designed to increase the speed from 2970 rpm (input), up to 5400 rpm (output).

This machine forms part of the 5 weekly vibration monitoring schedule, and has dynamic and displacement data recorded both at the machine and from 'Bently Nevada' displacement probes strategically located throughout the gearbox and pump.
Vibration data taken from the motor is typically below 1.2 mm/sec rms and gives no cause for concern. Displacement readings for the gearbox low speed shaft averaged 10 microns pk-pk with the high speed shaft averaging 11.5 microns pk-pk.

The pump displacement readings from as far back as August 89, and up to December 92, were consistently below 30 microns pk-pk and were considered satisfactory. However, a slight increase in trend activity had been observed over this period of time.
From December 92, and up to April 94 the displacement readings taken from the pump drive end bearing were becoming erratic, and had reached an overall level of 65 microns pk-pk, indicating a possible problem with the pump or coupling unit.
On examination of the spectrum it was clear to see that the predominant activity was that of the running speed component of 90Hz (5400 rpm).

In May 94 the overall vibration level had reached 95 microns pk-pk, the pump was removed from service and sent for overhaul and balance check/correction, see Figure 1 below.

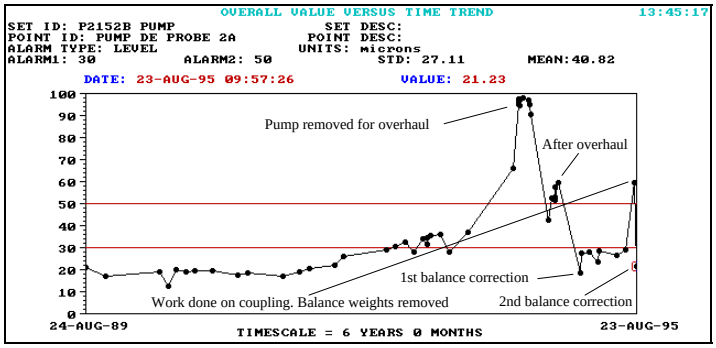

Figure 1 - Overall displacement trends at pump drive end

On re-installation back into service, the baseline data collected exhibited a running level in excess of 42 microns pk-pk, irrespective of the work done balancing the rotor. In January 95, AVT offered to perform an in-situ balance at the coupling to reduce any residual imbalance in the coupling itself. This required phase data to be recorded from the coupling at the pump drive end to determine the magnitude and direction of the imbalance component.

After a series of test runs, and with the addition of trail weights, we were able to calculate the correction weight and determine its angular position. From then on, the machine ran for some 7 months at levels below 30 microns, until such a time when the coupling was disturbed for maintenance purposes. After this work had been completed, vibration readings indicated that the initial imbalance had returned and thus the coupling was immediately suspect.

On examination of the coupling, it was noted that the original correction weights had not been replaced and therefore required the balance correction to be performed again. Figures 2 and 3 below testify the before and after results.

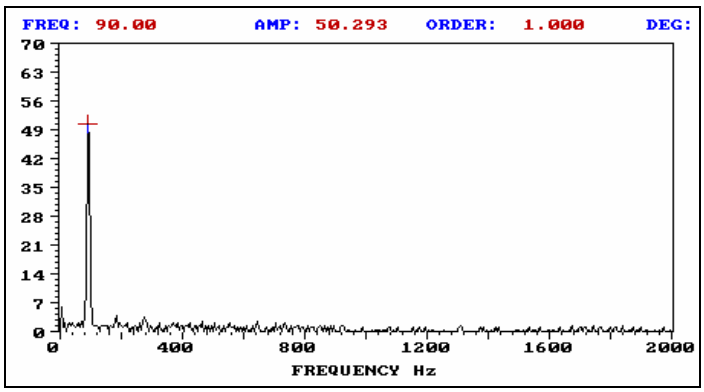

Figure 2 - Imbalance before correction (50 μm pk-pk)

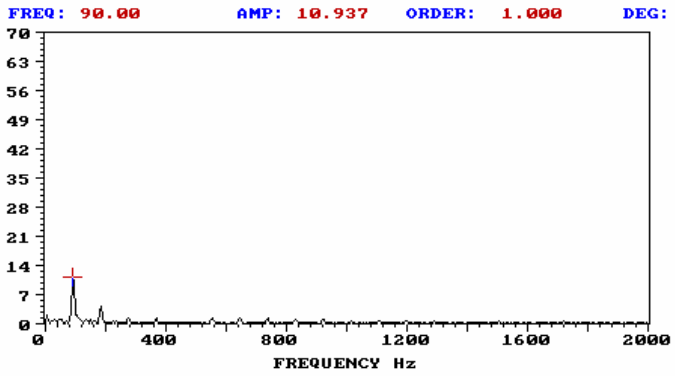

Figure 3 - Imbalance after correction (11μm pk-pk)

This in-situ balance allowed the machine to remain in service until such a time when operational and machine availability allowed machine removal for a full investigation of the problem.

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