



Technical Case Study

Industry: Power Generation

Technology: Vibration Analysis

Machine: Belt Driven Fan



Vibration Analysis | Belt Driven Fan | Introduction

On a periodical basis, this fan is measured as part of a global periodic vibration monitoring program in an **Power Generation** plant.

Some time after the inspection, an operator notices an **abnormal noise** and an additional measurement is taken on **motor and fan**. Once the motor is off, after 15 seconds, we can see some smoke coming out of it. On October 7, an uncoupled measurement is taken on the motor.

For that reason, and because of the criticality of the fan for production, there was a desire by the client to follow up on the defect and **online monitoring solutions** were discussed.



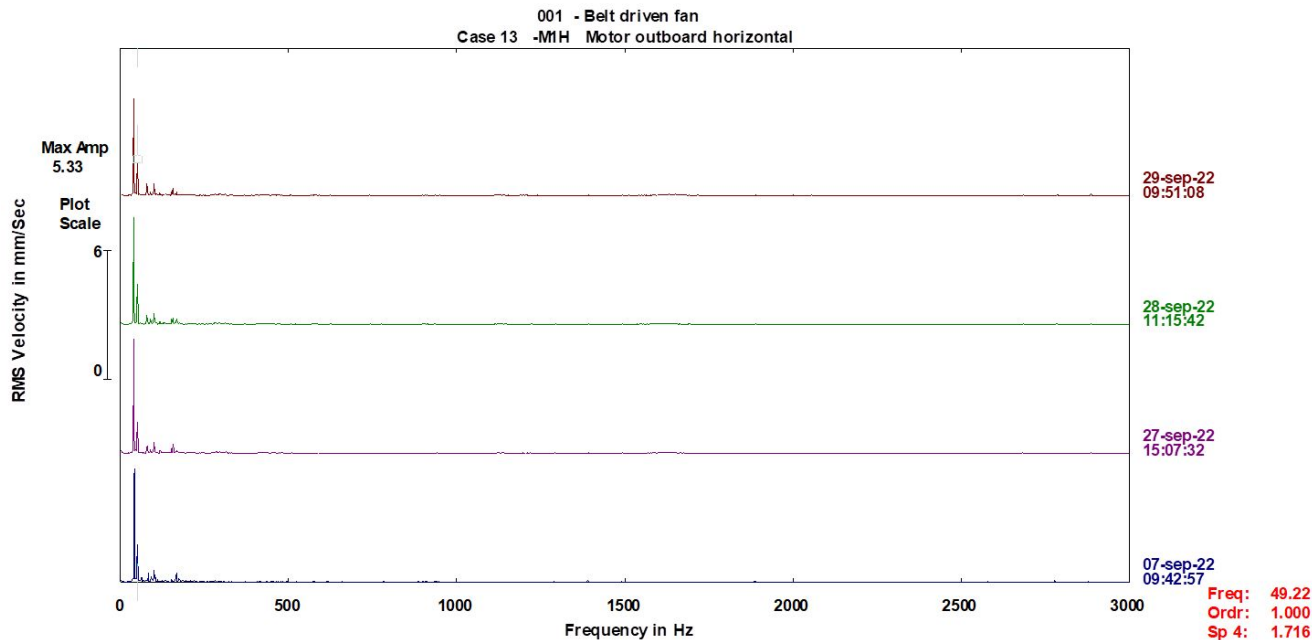
Machine	Belt driven fan
Latest deviated measurement	September 29, 2022
Baseline measurement	October 2022A
Running speed	2980 RPM (M) / 2500 RPM (F)



Vibration Analysis | Belt Driven Fan | Introduction

Thanks to our periodical measurements, we have highly valuable data before and after the visual inspection done by the employee.

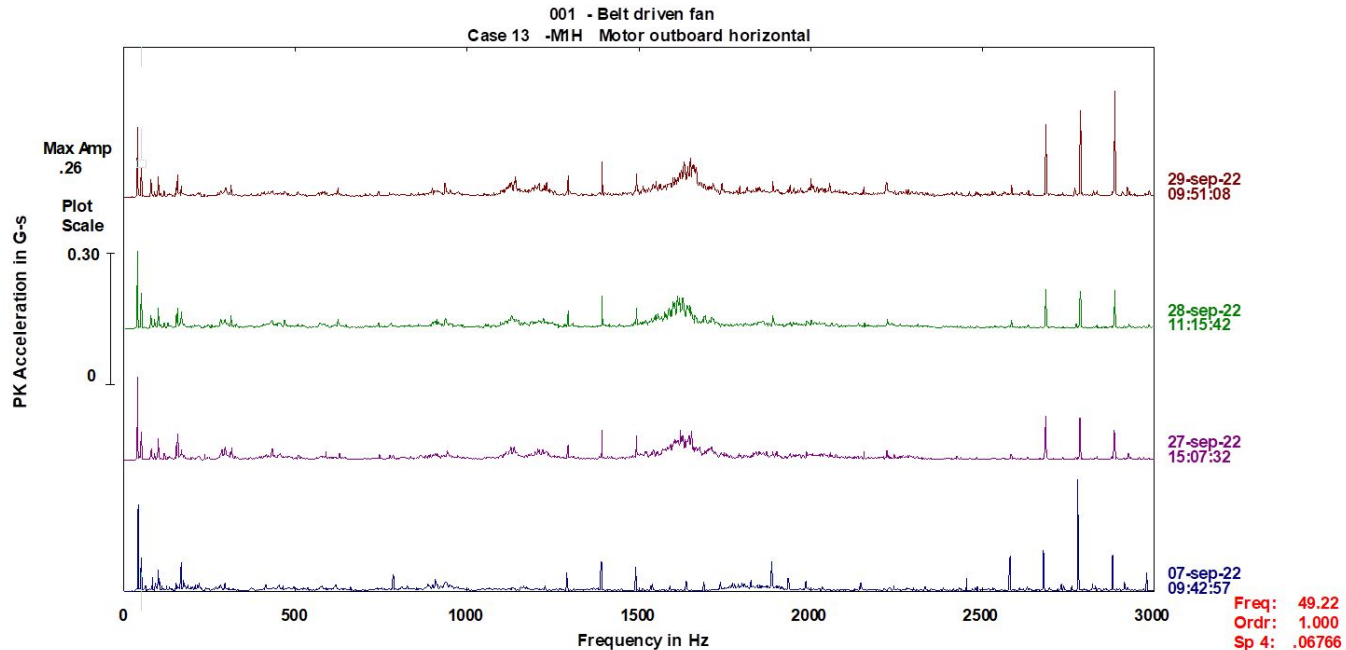
This data is showing a very **stable trend** when the data sets are viewed in a **velocity scale**.





Vibration Analysis | Belt Driven Fan | Data Analysis

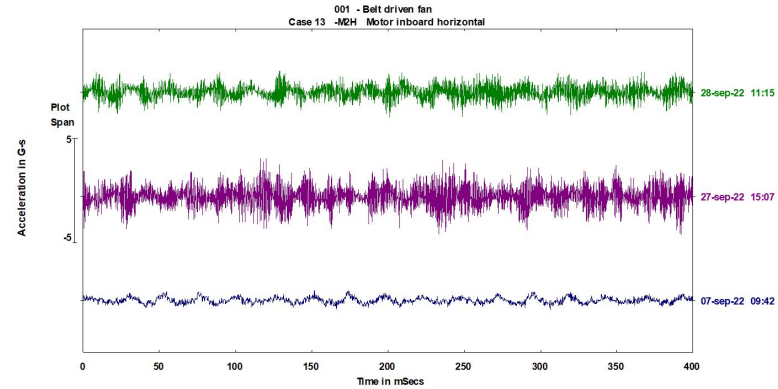
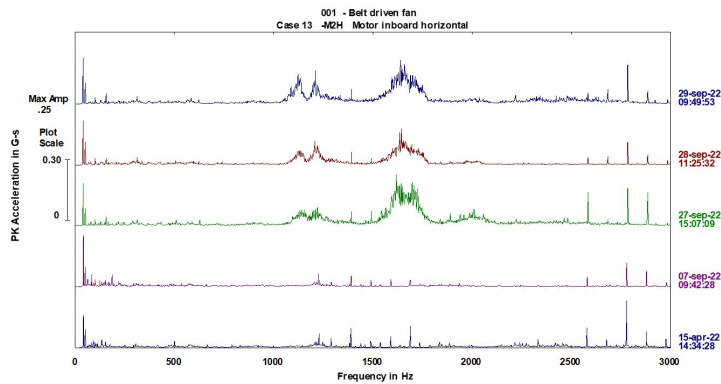
When viewed in an **acceleration scale**, we can notice a clear increase of the **noise level** around **1600 Hz**, which can explain the abnormal noise. However, the reason for this increase is not yet clear.





Vibration Analysis | Belt Driven Fan | Data Analysis

This **noise increase** is even clearer on the trend based on the vibrations generated on the motor (belt side), both in the **waveform and the spectrum**.





Vibration Analysis | Belt Driven Fan | Data Analysis

But it is not enough to stop the analysis. We are now **able to define *where* the noise is coming from but *not the why*.**

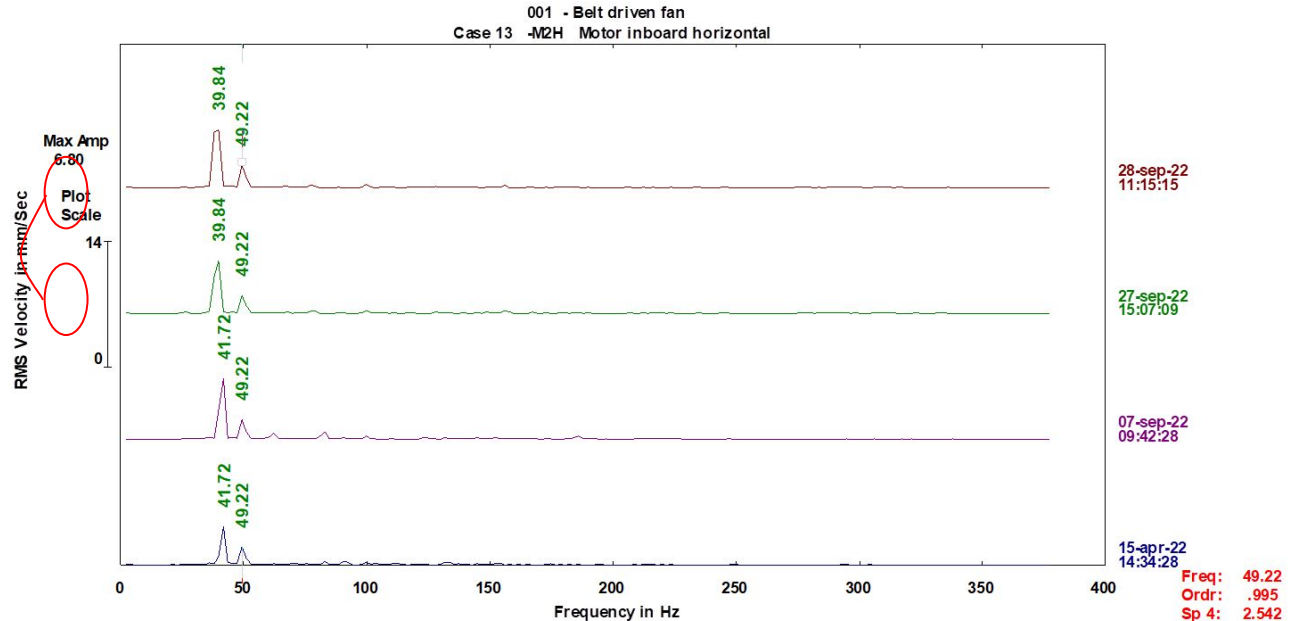
What else can be noticed with regards to the measurements **before** (Sept 7) and **after** (Sept 27) the inspection?



Vibration Analysis | Belt Driven Fan | Data Analysis

If we are looking in the details, we notice that the **fan speed is 1,86 Hz or 110 RPM**, which is lower than before the inspection, while the motor speed didn't change.

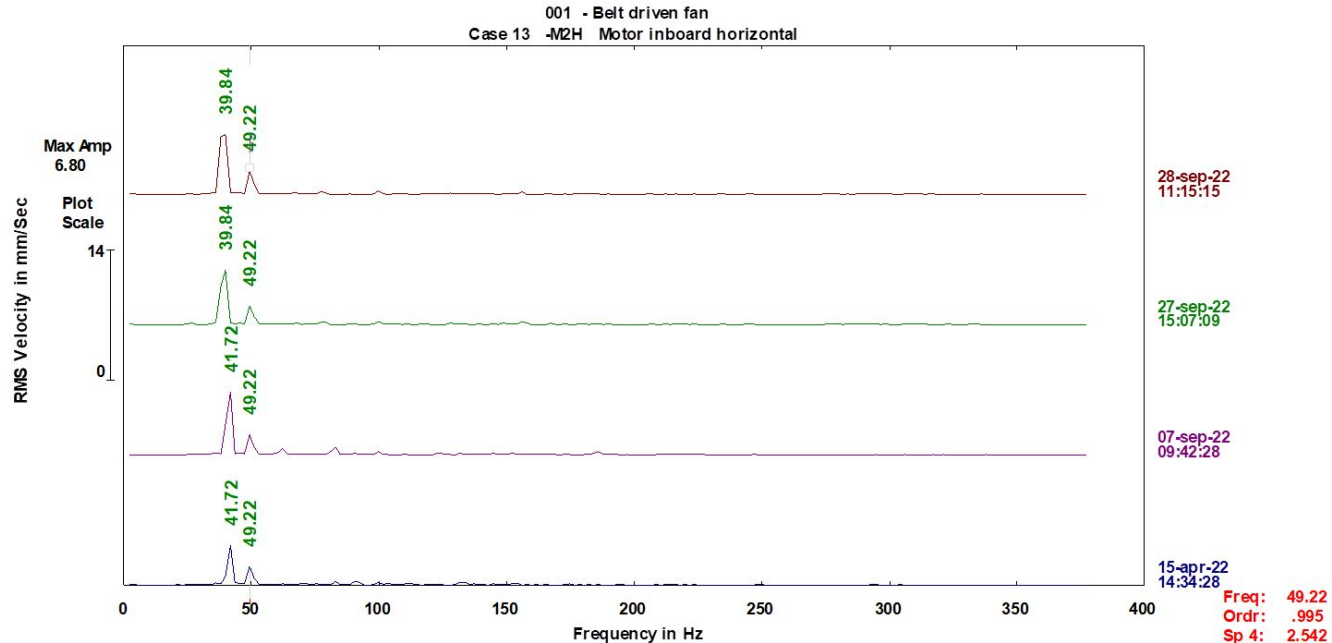
What could be the reason for this?





Vibration Analysis | Belt Driven Fan | Data Analysis

The lower speed can be explained by **excessive belt slip**, caused by low belt tension. This slip can also explain the noise in the spectrum as well as the abnormal noise heard by the inspector. It was recommended to check the **belt tension**.





Vibration Analysis | Belt Driven Fan | Conclusion

In **conclusion**, thanks to this follow-up and the measurements done before and after the inspection, we were able to detect a **defect on the belt coupling**.

It was confirmed that the **belt frequency (belt resonance) is 10Hz lower** compared to the required value.

Following these proposed actions, the belt tension was checked and modified and the **noise and the vibration disappeared**. The **correct belt tension will also decrease energy consumption up to 15%**.



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