



Technical Case Study

Industry: Tires

Technology: Vibration analysis

Machine: Fans



Problem diagnosis | Fans | Introduction

As part of periodic predictive measurements, I-care performs routine vibration measurements on the production line every 2 months. In the period between measurements, the customer asked us for an additional examination, because after the modernization work carried out on the production line, they observed **disturbing sounds. Increased vibrations on the fans visible to the naked eye were detected. These fans are critical in the tire plant** (one of them can be seen in the photo on the right).

I-care engineers immediately responded to the customer's inquiry, showing up at the factory to verify the abnormality and diagnose the problem.





Fans | Introduction

The modernization of the production line was carried out at the plant, which included the replacement of electric motors, a change of the coupling from a belt transmission and V-belts to a belt and sprockets, and a change in the engine base element. Before starting the line, the customer asked us to check and correct the linearity of the pulleys and balance the rotor. After correctly performed actions, the line was launched to verify the correctness of the operation. However, the modernization caused irregularities in the operation of the machine, i.e. noise and raised vibrations on the fans visible to the naked eye.

In the first step of their task, I-care engineers analyzed the documentation on the changes made to the line. They immediately noticed irregularities that could have caused noise and vibration, due to the fact that the new engines had a longer length than the disassembled drives. On the W2 Left and W2 Right fans, the fan shaft was extended, on which the pulley is mounted, which caused the drive wheels to move away from the base.



Vibration analysis | Fans

After correctly performed balancing and alignment operations and the first start-up of the machine, I-care engineers performed vibration measurements.

There was a significant increase in vibration compared to previous results (before modernization). It was decided to install a WI-care™ system to continuously monitor the increasing vibrations.

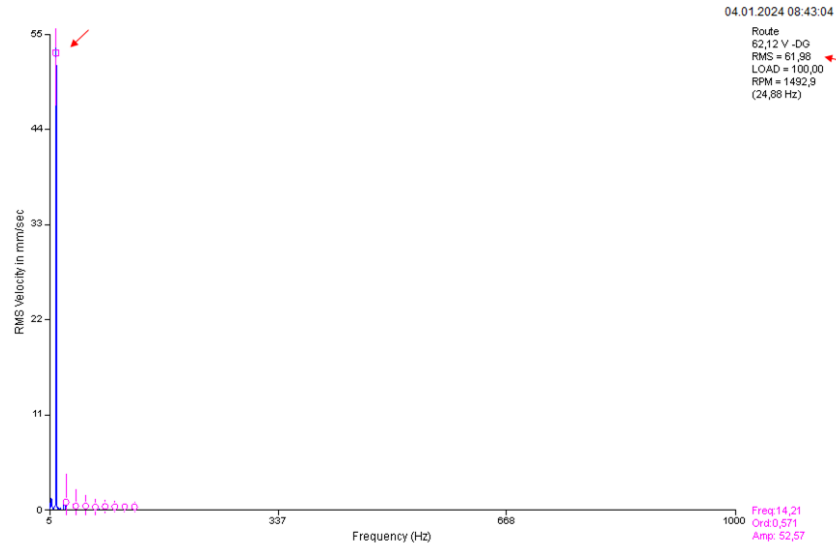
Based on their knowledge of vibration and machine construction, I-care specialists concluded that the increase in vibration was due to reduced stiffness and a change in engine attachment points.





Vibration analysis | Fans

Vibration measurements taken for several days in a row showed that the amplitudes were increasing, which could result in a serious breakdown or accident. The highest level of vibration speed was recorded on the W2 Right fan at the BAV measuring point - 61.98 mm/sec RMS. Of which the highest amplitude came from the frequency of 1X the rotor speed.



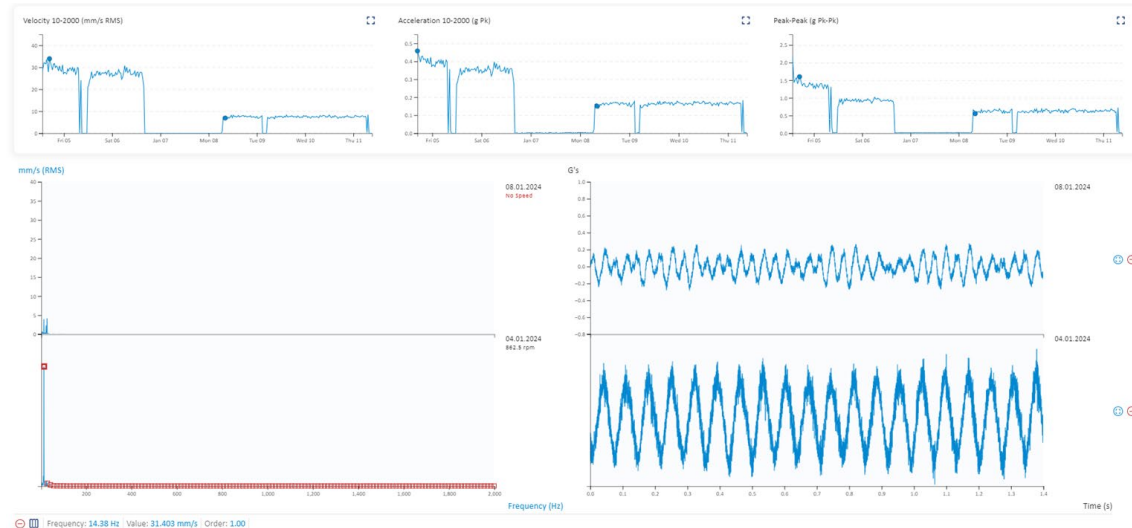
AMS Suite: MHM - Fan Vibration Speed



Wi-care™ System | Fans

We offered the Client the installation of the WI-care™ system - a wireless system for monitoring the condition of machines 24/7, which in real time transmits and analyzes the measurement data directly to the cloud application i-SEE. In addition to data collection and analysis, the system also alerts UR personnel about anomalous and critical values for a given machine.

The system of five sensors installed on the machine allowed the Customer to monitor the critical resource around the clock, until the cause of the high value of the effective vibration speed was eliminated. Thanks to the Wi-care™ system, it was possible to monitor the vibration values, which stabilized. This allowed production to continue until the planned standstill, which reduced the significant costs associated with unplanned line stoppages.



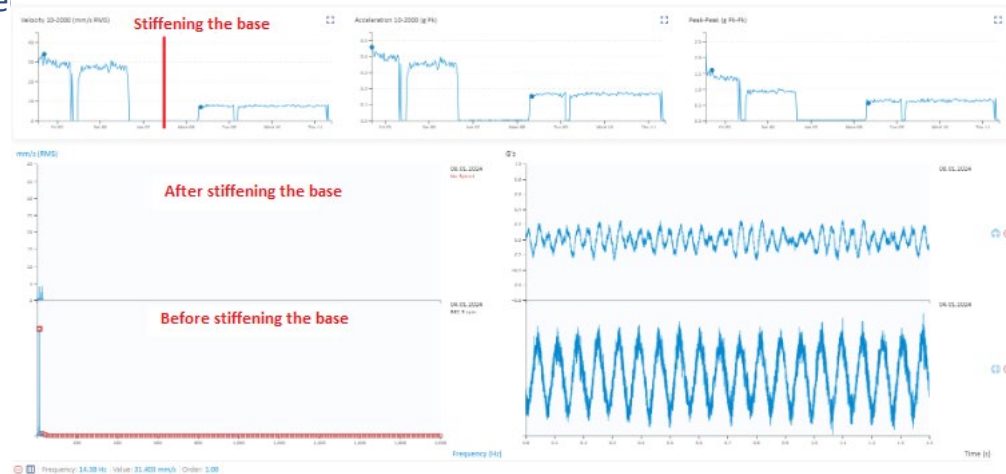
I-See Analysis. Comparison of W2L before and after base stiffening.



Wi-care™ System | Fans

After performing diagnostic tests, collecting data from the Wi-care™ system and analyzing the problem in depth, I-care engineers concluded that the solution would be to strengthen the base of the machine by mounting the channel sections.

The mechanics of the tire plant implemented the recommended repair work. After it was performed, we re-analyzed the vibration measurements made with the Wi-care™ system. After fixing the channel sections in the center of the base in the places of attachment of the motor, the effective value of the vibration speed

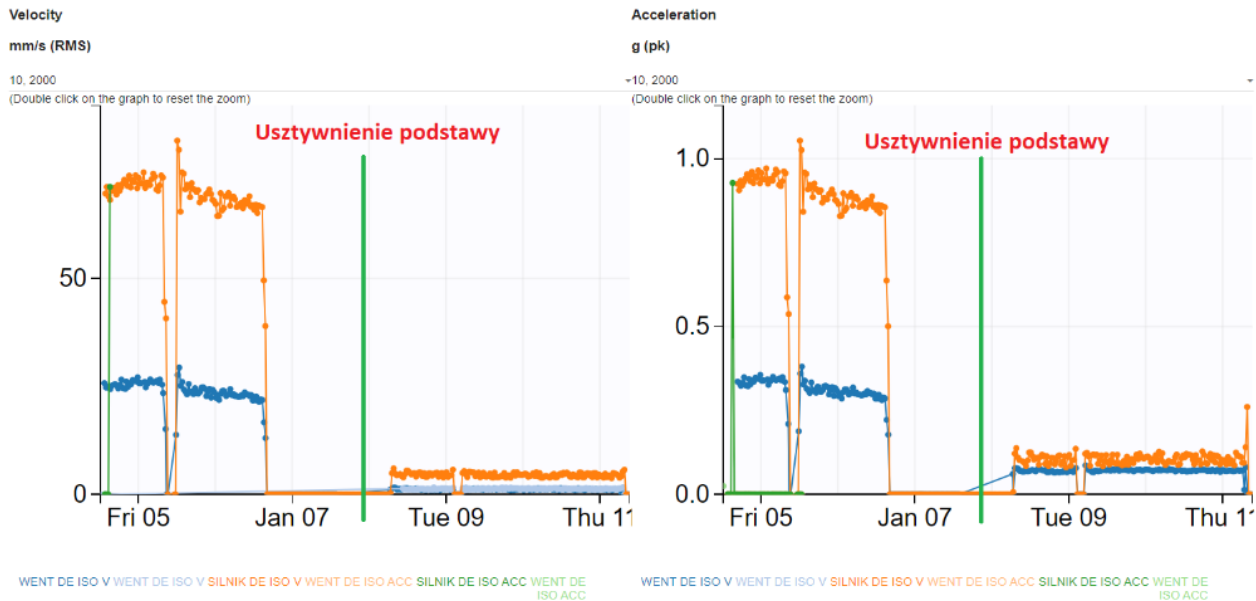


I-See Analysis. Comparison of W2L before and after base stiffening.



Wi-care™ + I-see system | W2P fan - trend

The following trend from the I-see application shows the effect of base stiffening on the RMS value of vibration velocity and acceleration.



I-See - trend of the RMS value of the W2P fan vibration speed and acceleration.



Wi-care™ System | Fans - Base Reinforcement

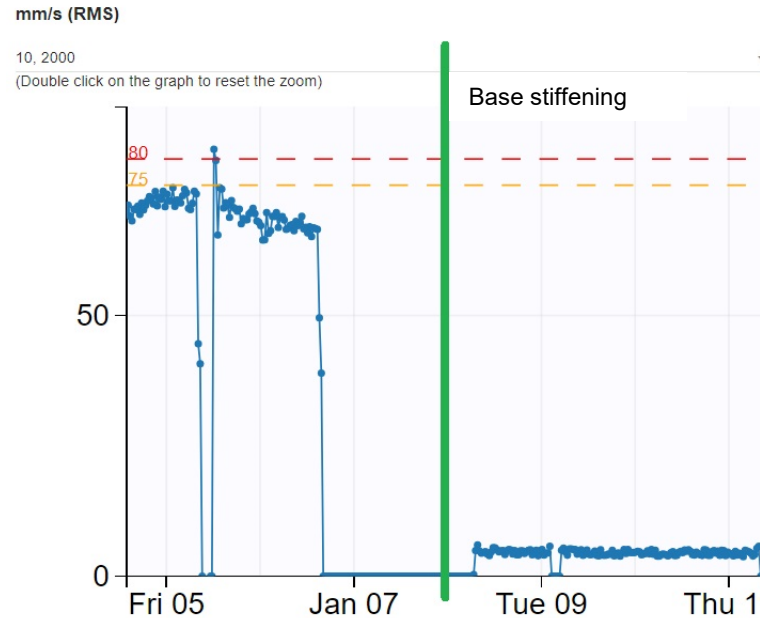


Strengthening the fan base according to the recommendations of I-care specialists.



Wi-care™ System | Fans

The Wi-care™ system recorded a vibration speed of 75.79 mm/sec RMS before the base was stiffened. When the base was stiffened, the vibration speed dropped to the level of 2.96 mm/s RMS.



Vibration velocity graph in mm/sec RMS of the Wi-care™ system from the i-See app.



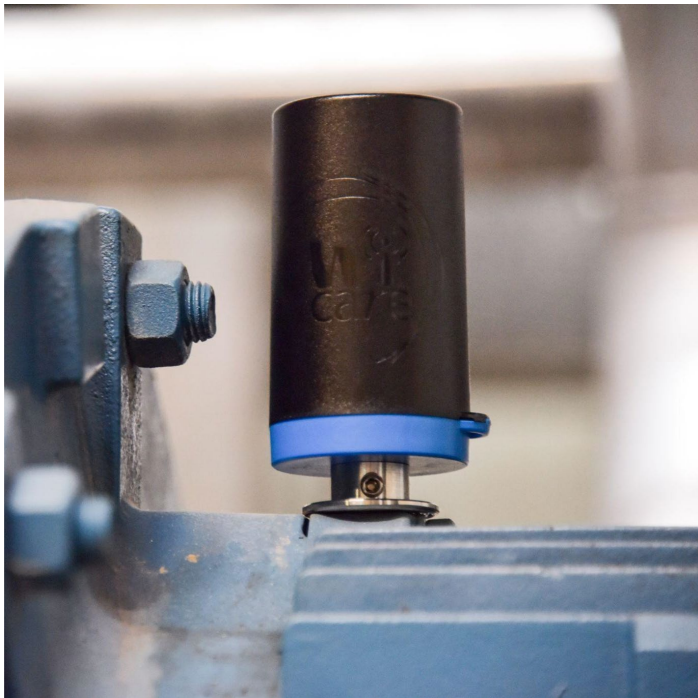
Fans | Conclusions

After conducting a vibration analysis with the mounted Wi-care™ sensor system for wireless mass monitoring, I-care experts diagnosed the cause of the problem in detail. The analysis was carried out after the customer had modernized the production line. However, our experts did not stop only with the diagnosis of the resource. They offered the Client an effective corrective action in the field of structural engineering, which, after implementation, eliminated the problem.

1. Conducting control measurements after the completion of the modernization work of the machines is crucial for the safety and efficiency of the resource.
2. The rigidity of the base often has a key effect on the level of vibration and the durability of the machines.
3. The use of the Wi-care™ system allows continuous monitoring and diagnostics both during the gradual wear of machine parts and irregularities resulting from modernization errors.
4. Thanks to the Wi-care™ system, the fans, on which the vibrations were constantly increasing, were under constant control and alarm thresholds set to send warnings both by SMS and by e-mail, alerted about critical values.
5. The help of qualified and experienced specialists from I-care made it possible to avoid high repair costs and long line downtime. The proposed actions proved to be one hundred percent accurate and effective lasting, prolonging the safe and reliable operation of the machines.
6. After the research, detailed technical data, analysis and resource recommendations were provided to the customer in a comprehensive report prepared by I-care engineers.



Fans | Conclusions



The use of predictive maintenance methods (PdM), supported by continuous monitoring with Wi-care™ systems, significantly increases safety and production efficiency through early detection of potential failures. With remote monitoring, companies can optimize maintenance work, reduce operating costs and ensure a higher level of work safety. Wireless machine monitoring systems allow precise prediction of failures and automatic notification of the need to stop production, minimizing the risk of unplanned downtime and failure. They also make it possible to carry out additional measurements after modernizations, which is crucial to ensure the proper functioning of the machinery and the entire production line.

Investing in modern monitoring and data analysis technologies is crucial to improving competitiveness by optimizing costs and increasing the reliability of production processes.

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