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Vibration measurements

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1 ABSTRACT

This report discusses the measurement of vibration, an important parameter in machine maintenance and occupational health and safety. The report highlights the significance of measuring vibrations to investigate the condition of machines, prevent bearing faults, and investigate vibration exposure on workers' hands. Two quantities of vibration, vibration velocity (mm/s) and vibration acceleration (m/s2), are measured using a vacuum and an air blower, and the results are compared to the values given in guides and standards. The report also investigates the vibration given by the air blower when changing power from 0 to 2 to 5.

2 INTRODUCTION

2.1 Background

Vibration is a key factor to measure in machine maintenance and occupational health and safety. Vibration may influence the durability and reliability of machinery systems or structures and cause problems such as damage, abnormal stopping and disaster (What Is the Need for Vibration Measurement? - Knowledge - Test Laboratory – Amtest, Test and Measurement, n.d.). Therefore, it is essential to measure and monitor vibration to ensure the proper functioning of machines and protect workers from harm.

2.2 Purpose

The purpose of this experiment is to measure vibration velocity and acceleration on a vacuum and an air blower to investigate their condition and prevent bearing faults. The measurements will be compared to values given in guides and standards to determine the reliability of the machines.

2.3 Content of the work

This report will provide a discussion of the theory and principles related to vibration measurements, the equipment used in the experiment, and the measurements taken. The results will be presented, and conclusions will be drawn based on the findings.

3 Theory

3.1 Theory and principle related to the work

Vibration is the motion of a machine or its component back and forth from its position of rest. It is measured in terms of vibration velocity and acceleration (Government of Canada, Canadian Centre for Occupational Health and Safety, 2023). Vibration velocity is the speed at which the machine vibrates, and it is measured in mm/s. Vibration acceleration is the rate of change of velocity, and it is measured in m/s^2. These two measurements are essential for determining the condition of machines and identifying potential faults before they lead to failure.

3.2 Equation

There are no specific equations regarding the experiment.

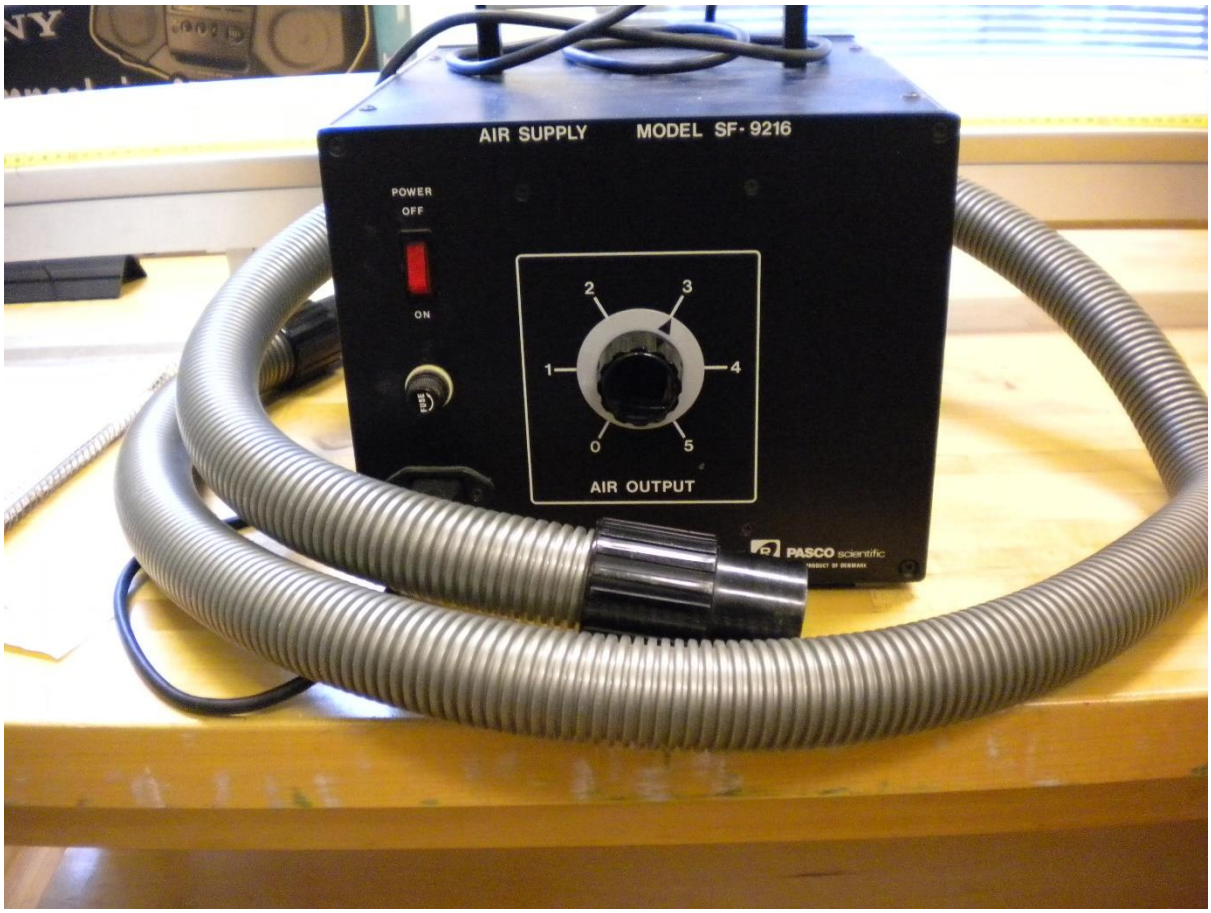
4 Equipment and measurements

4.1 Measuring equipment

we use vibration meter and an accelerometer to measure vibration velocity and vibration acceleration of the vacuum and the air blower bellow in this experiment.

vibration meter and an accelerometer

Vaccum



Air blower

4.2 Measurements

For task 1, we will put the sensor on each machine separately at the average power to measure their vibration velocity and vibration acceleration.

For task 2 these measurements were taken at different power levels to investigate the effect of changing power on vibration.

5 Result

The results from the measurements are recorded into a table as below.

	Vibration velocity (mm/s)	Vibration acceleration (m/s2)
Vaccum	1,5-1,7	0,20
Air blower	1,1-1,3	0,1
Air blower power 0	1,3	0,1-0,2
Air blower power 2	1,1-1,3	0,1
Air blower power 5	1,3-1,7	0,1

6 Conclusions (Reflection)

Condtion	Vibration velocity mm/s
Newly commisioned	<1,4
Unrestricted operation	< 2,8
Restricted operation	2,8 - 4,5
Damage occured	>4,5

Figure 1. Literature values

Compared to the literature values table both machines are relatively new because the vacuum and air blower vibration velocity is near to 1.4 mm/s.

7 References (Literature references / Sources)

Government of Canada, Canadian Centre for Occupational Health and Safety. (2023, April 5). *Vibration - Introduction*. https://www.ccohs.ca/oshanswers/phys_agents/vibration/vibration_intro.html

What is the need for vibration measurement? - Knowledge - Test Laboratory – Amtest, test and measurement. (n.d.). https://testlab.amtest.eu/en/knowledge/what-is-the-need-for-vibration-measurement#:~:text=Vibration%20may%20influence%20the%20durability,countermeasure%20to%20prevent%20these%20problems.

Riddle, S., & Riddle, S. (2023). Understanding the ISO 10816-3 Vibration Severity Chart. *Acoem USA - the Reliability Partner*. https://acoem.us/blog/other-topics/understanding-the-iso-10816-3-vibration-severity-chart/#:~:text=An%20acceptable%20vibration%20level%20would,such%20as%20unbalance%20or%20misalignment.