# Case Study: Kiln Hood Fan

## Introduction

In this case study, Machinery Diagnostics Institute (MDI) was commissioned to address a high vibration issue on a kiln hood fan at a construction plant located in Queensland, Australia. Effective vibration analysis plays a crucial role in identifying such issues before they lead to further damage or unplanned downtime.

## Analysis

MDI utilized the following condition monitoring solutions to analyze the kiln hood fan and determine the root cause of its elevated vibrations:


**AC292**

*Premium compact size accelerometer, 100 mV/g, ±5%*

**MH137-1A**

*Curved surface mounting magnet, 15 lbs (6.8 kg) pull strength*

**CB108-C395-006-K2C-SF**

*CB108 coiled cable with C395 connector on the left, a safety feature in the middle, and a K2C connector on the right, 6 ft. (1.8 m) length*

**CommTest vb7 Data Collector**

| | | |
|---|---|---|
| **Machine Info.** | **Kiln Hood Fan #1** | |
| **Date** | **29.04.2023** | |
| **Speed** | **1451** | RPM |
| **No. of blades** | **8** | |
| **Angle between Blades** | **45** | Degree |
| **Rotor Weight** | **N/A** | Kg |
| **Rotor Diameter** | **N/A** | cm |
| **Device Used** | Commtest VB7 | |

| Original Run (O) | (1X) Amp mm/s | Phase |
|---|---|---|
| FDEH | 10 | 349 |
| FDEV | 11 | 350 |
| FNDEH | 3.18 | 226 |
| FNDEV | 4.9 | 220 |

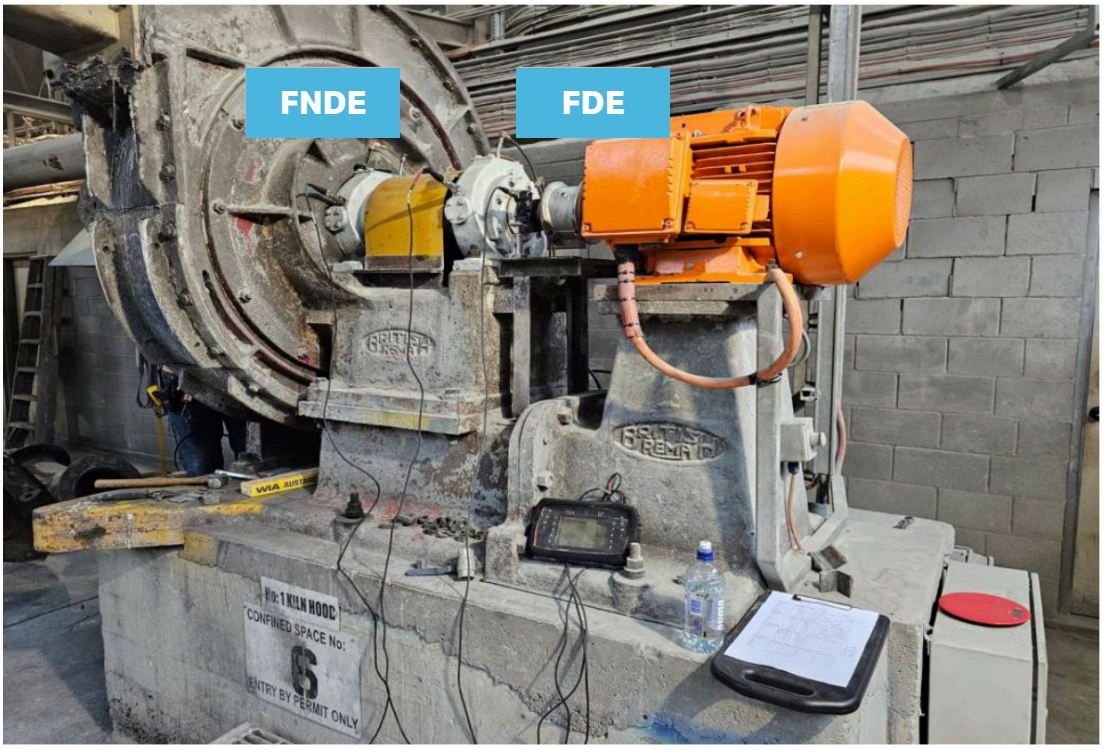
| Trail weight | 230 gm | 270° | Removed | | |
|---|---|---|---|---|---|
| Trail Run (O+T) | (1X) Amp | Phase | Estimated Correction Weights | | Speed of |
| FDEH | 14.1 | 318 | 259 gm | 169° | 1099 Rpm |
| FDEV | 14.1 | 318 | 217 gm | 180° | 60 % |
| FNDEH | 4.1 | 180 | 277 gm | 291° | |
| FNDEV | 5.3 | 202 | 685 gm | 175° | |

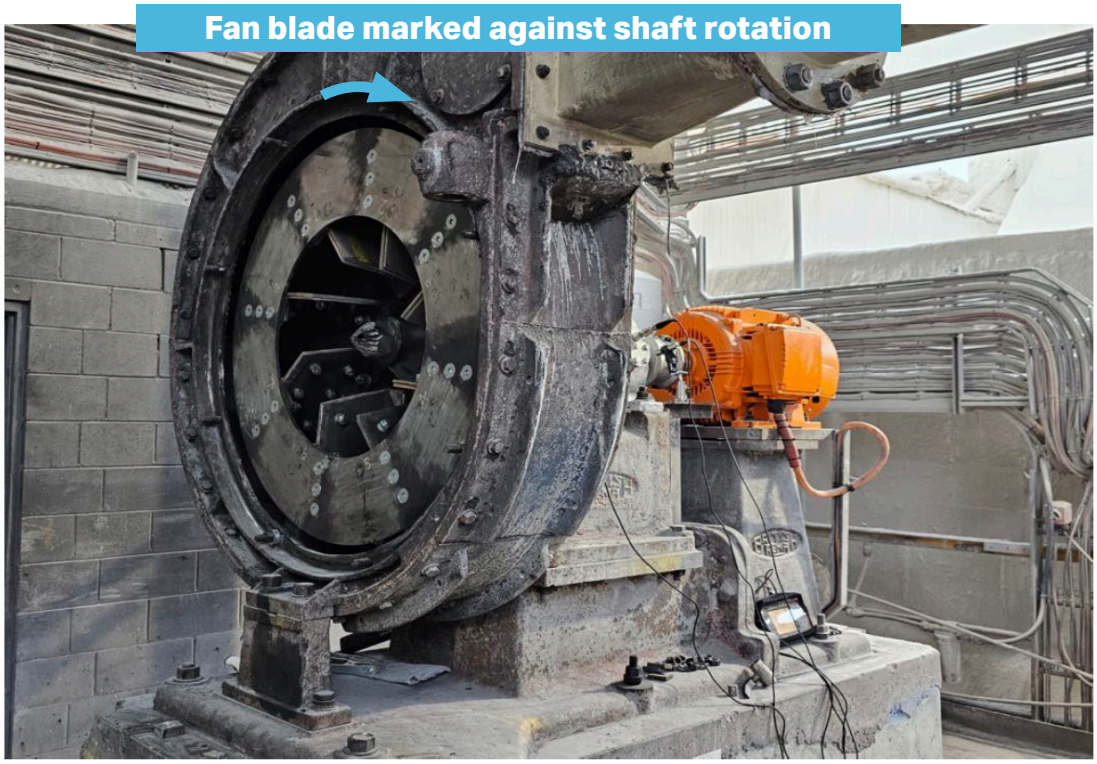
| Correction Weight | 210 gm | 180 | | | |
|---|---|---|---|---|---|
| Correction Run | (1X) Amp mm/s | Phase | Estimated Weights | | Speed of |
| FDEH | 6.8 | 249 | gm | ° | 1099 Rpm |
| FDEV | 7.1 | 350 | gm | ° | 60 % |
| FNDEH | 1.8 | 183 | gm | ° | |
| FNDEV | 2.3 | 173 | gm | ° | |

| Trim Weight | 100 gm | 180° | |
|---|---|---|---|
| Trim Run | (1X) Amp mm/s | Phase | Speed of 1451 |
| FDEH | 0.9 | 64° | Rpm 80 % |
| FDEV | 0.9 | 61° | |
| FNDEH | 0.9 | 200° | |
| FNDEV | 0.6 | 190° | |

| Final Readings | (1X) Amp mm/s | Overall | Units | Speed of 1451 |
|---|---|---|---|---|
| FDEH | 0.9 | 1.1 | mm/s | Rpm 80 % |
| FDEV | 0.9 | 1.1 | mm/s | |
| FNDEH | 0.9 | 1 | mm/s | |
| FNDEV | 0.6 | 0.9 | mm/s | |

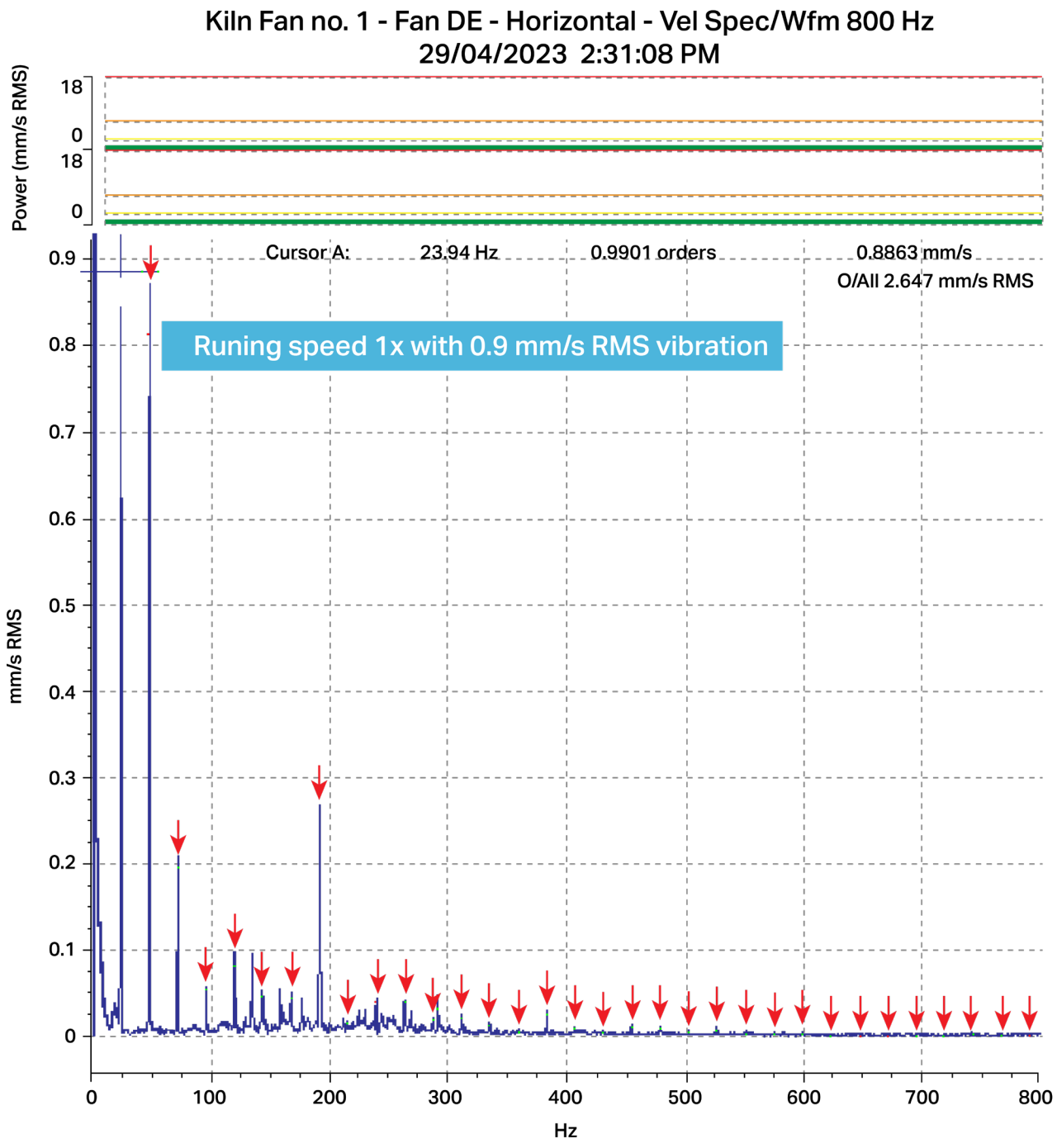
## Machine Layout



The Fan Drive End (FDE) - horizontal direction - vibration spectrum shows vibration levels of 0.9 mm/s RMS at the running speed of 1451 RPM - 80% - after fan balancing:

**Vibration levels after fan balancing**




**Spectrum shows 1x and 2x, which could be caused by minor misalingnment**

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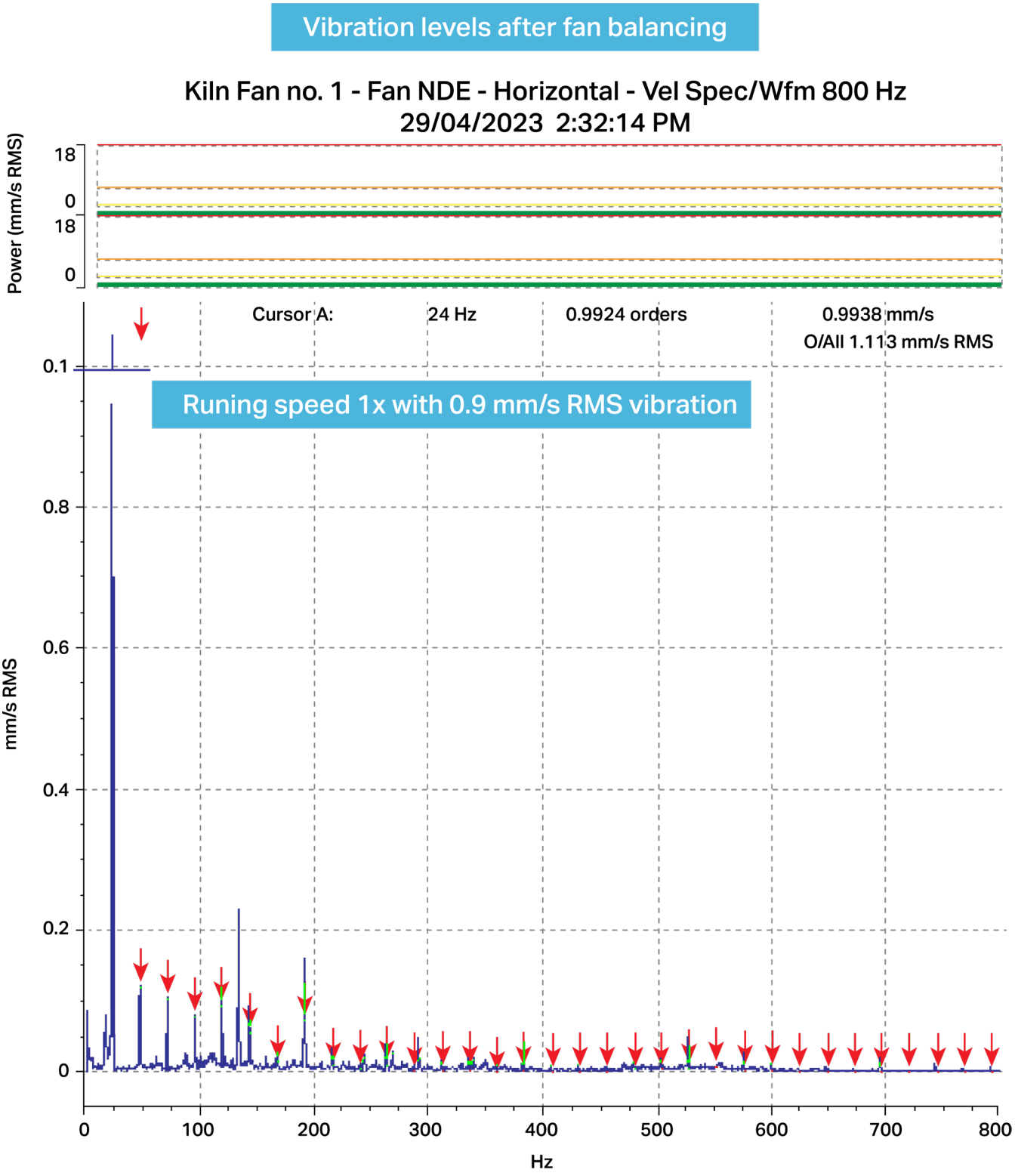
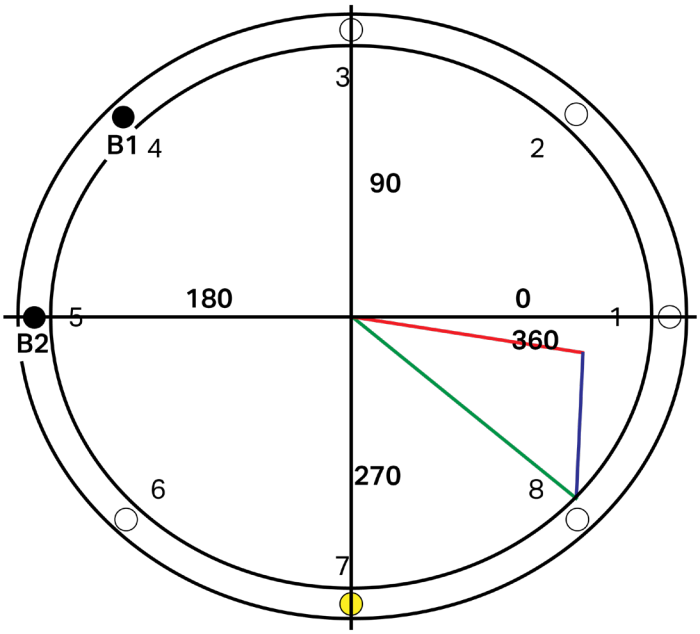


# Polar Plot




Balancing Weights
- (•) Trial Weight Removed
- ( ) Trial Weight Remained

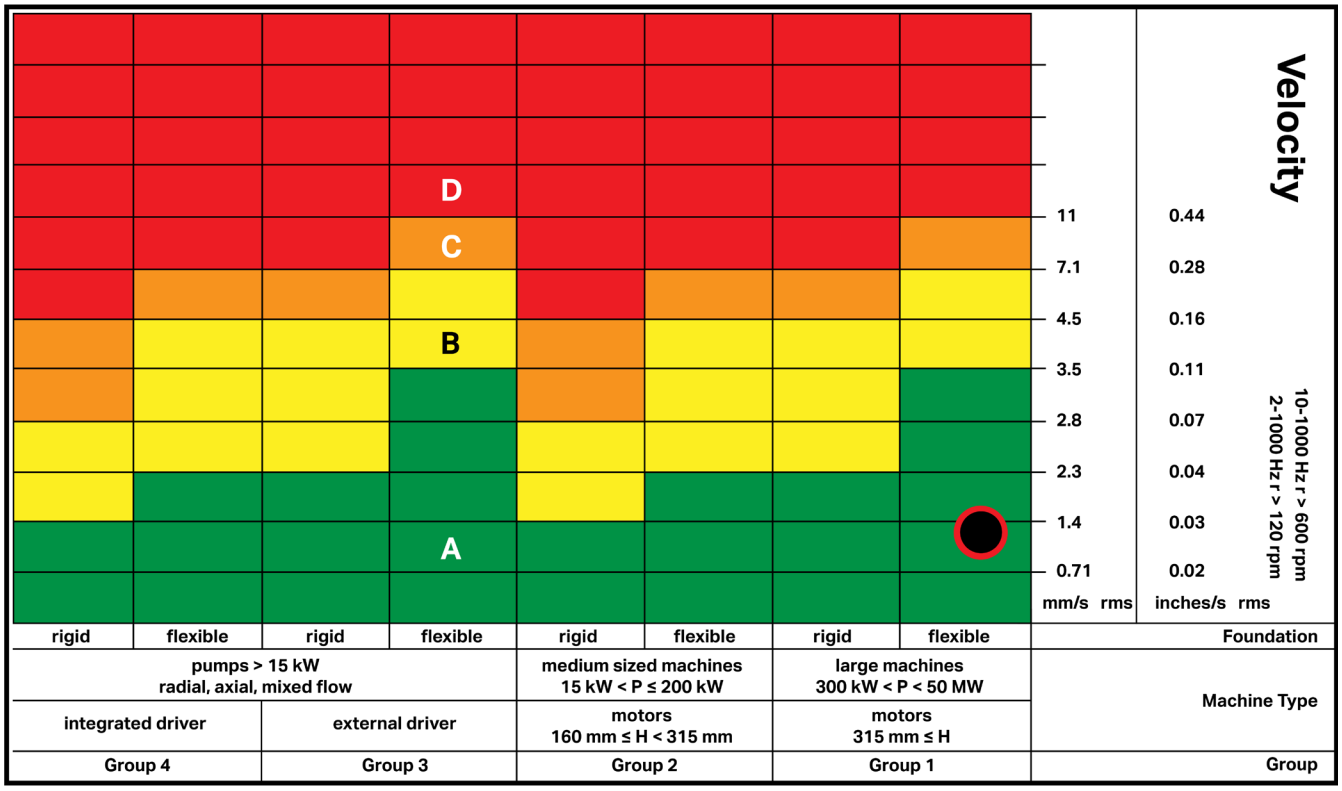
- Original Vibration
- Trial Weight Effect
- Original + Trial Weight
- Trial Weight
- Balance Weights

**Influence Coefficient**

| 0.032@357 deg mm/s/g |
|---|

| | |
|---|---|
| Original Vibration | |
| Original Vib. + Trial Weight | |
| Trial Weight Effect | |

## Standards




### Comments and Recommendations

The fan shows acceptable vibration levels according to the ISO 20816-3 Standard at 80% of its running speed (approximately 1451 RPM). However, at 60% of the running speed (around 1080 - 1099 RPM), the vibration levels were relatively high. This is due to the fan operating near the natural frequency of the machine base, causing resonance. To avoid resonance issues, it is recommended to avoid running the fan in the 1080 - 1099 RPM range.