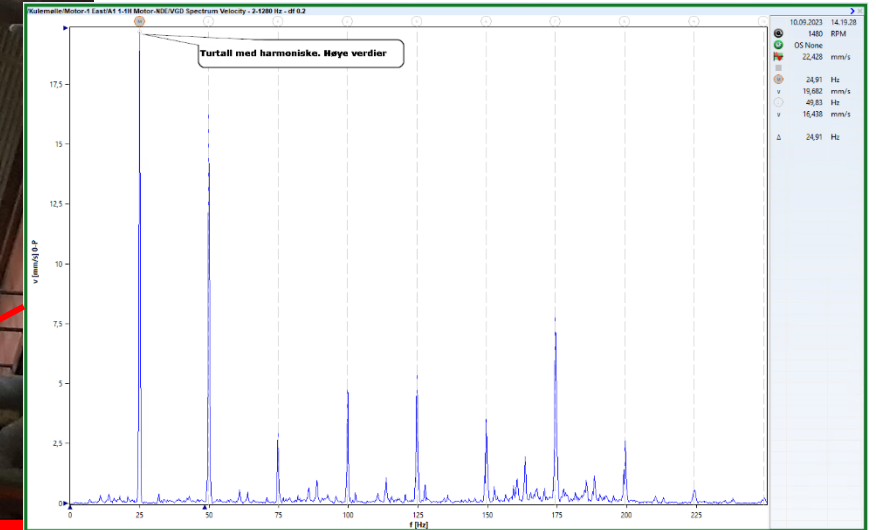
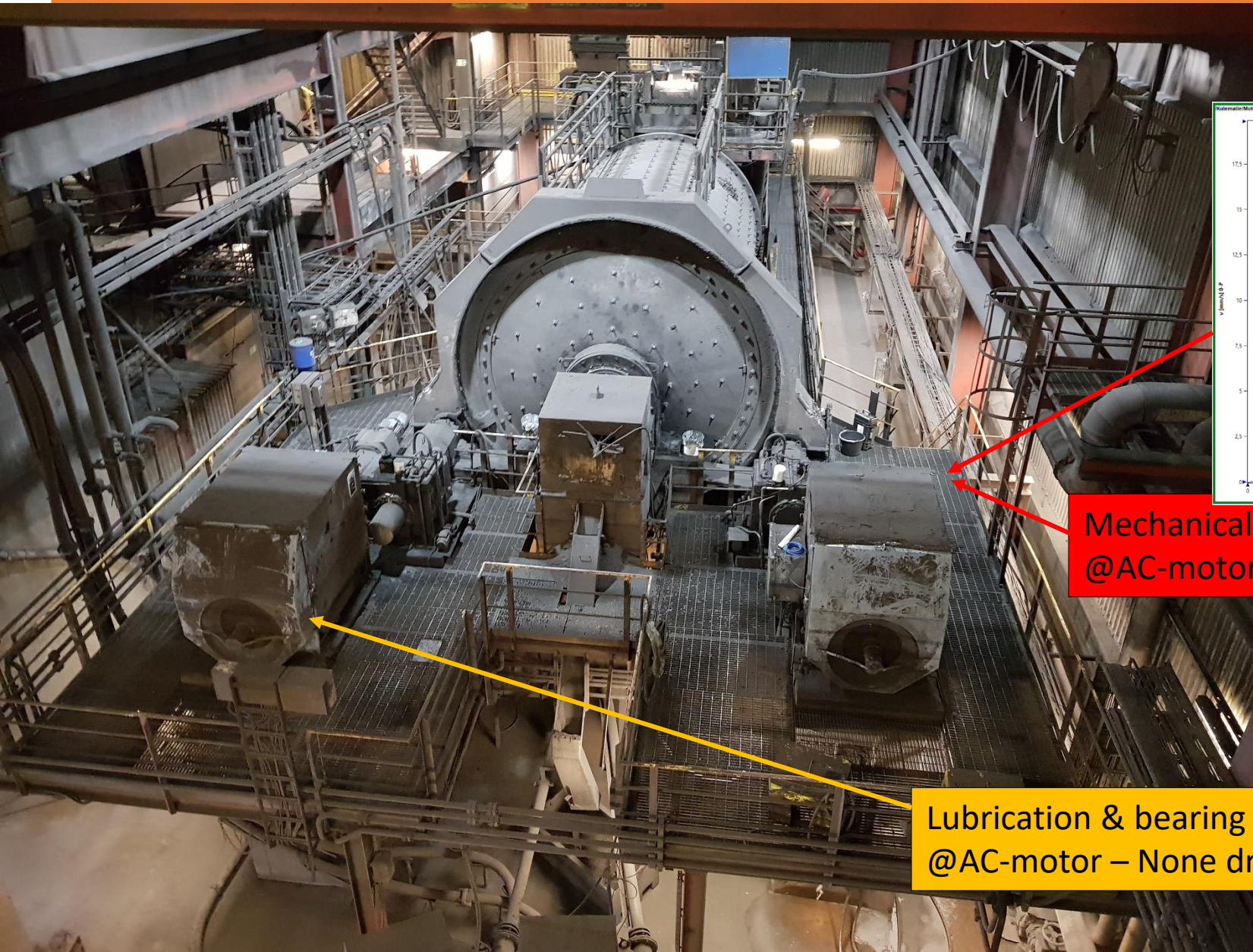


Case study – Ball mill, 2023



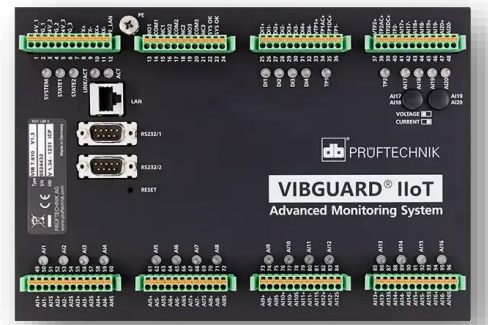
Mechanical / rotating loosenes
@AC-motor – drive end

Lubrication & bearing wear (BPFO)
@AC-motor – None drive end

Case study – Ball mill, 2023

All production critical machines are continuously monitored by the Vibguard vibration system. →

AMPs is doing the remote diagnostic and reporting. →



Background:

- In Q2 2023 the factory was stopped for major maintenance.
- The motors for the ball mill was sent to workshop for overhaul due to winding conditions.
- Factory back in operation in June 2023.
- Warnings from day 1.

Machine	Dev Type	Status	Date	
Kulemølle Øst	Vibration	Alarm	11-09-2023	View
Kulemølle Øst	Vibration	Warning	03-07-2023	View
Kulemølle Øst	Vibration	Notification	03-01-2023	View

Case study – Ball mill, 2023



Asset Management & Predictive Solutions

AMPs Reliability Gate Report

AMPs AS
rds@amps.no
+4791523878



Machine

Kulemølle Øst

Company

Location

Online

IMO Number

Class

SFI/TAG

62-200.01

In Operation

Running Hours

Machine Interval

3M

Date

11-09-2023

Deviation Type

Vibration

Approved By

Tommy Ciesnes

Analysed By

Thor-Kenneth

Alarm

Findings	Machine Component	Diagnostic	Severity	Prognostic & RUL	Confidence
No. 1	Lager DE og NDE	Looseness - Alvorlig slitasje på maskinen	S4	Maskinens levetid reduseres RUL <2%	90% or Higher

Recommendation

ble informert om økningen per telefon mandag morgen 11/9.

rapporterer om hørbar støy fra motoren.

Vi ser i overhalingsrapport fra at det er foretatt arbeid i lagerhus/isolasjon. Dette kan være en mulig årsak til looseness-mønsteret, dersom isolasjonen er løst. Dette må kontrolleres/bekreftes.

Det anbefales å stoppe motoren for feilsøking og reparasjon.

Alarm report

Recommendation

- client was informed about the severity by phone Monday morning 11 sept.

- By studying the motor drawing, we suspect the bearing housing to be loose. Please inspect.

- Motor should be stopped to avoid breakdown



Case study - Ballmill, 2023

Client followed recommendation and went out to inspect the motor immediately.

Finding:

- All 4 bolts loose on the bearing housing. Pictures at next page.

Action:

- Tighten the loose bolts.

Result:

Motor status is back to acceptable, you can continue to operate the motor.

Case study - Kulemølle, 2023



Case study - Ballmill, 2023



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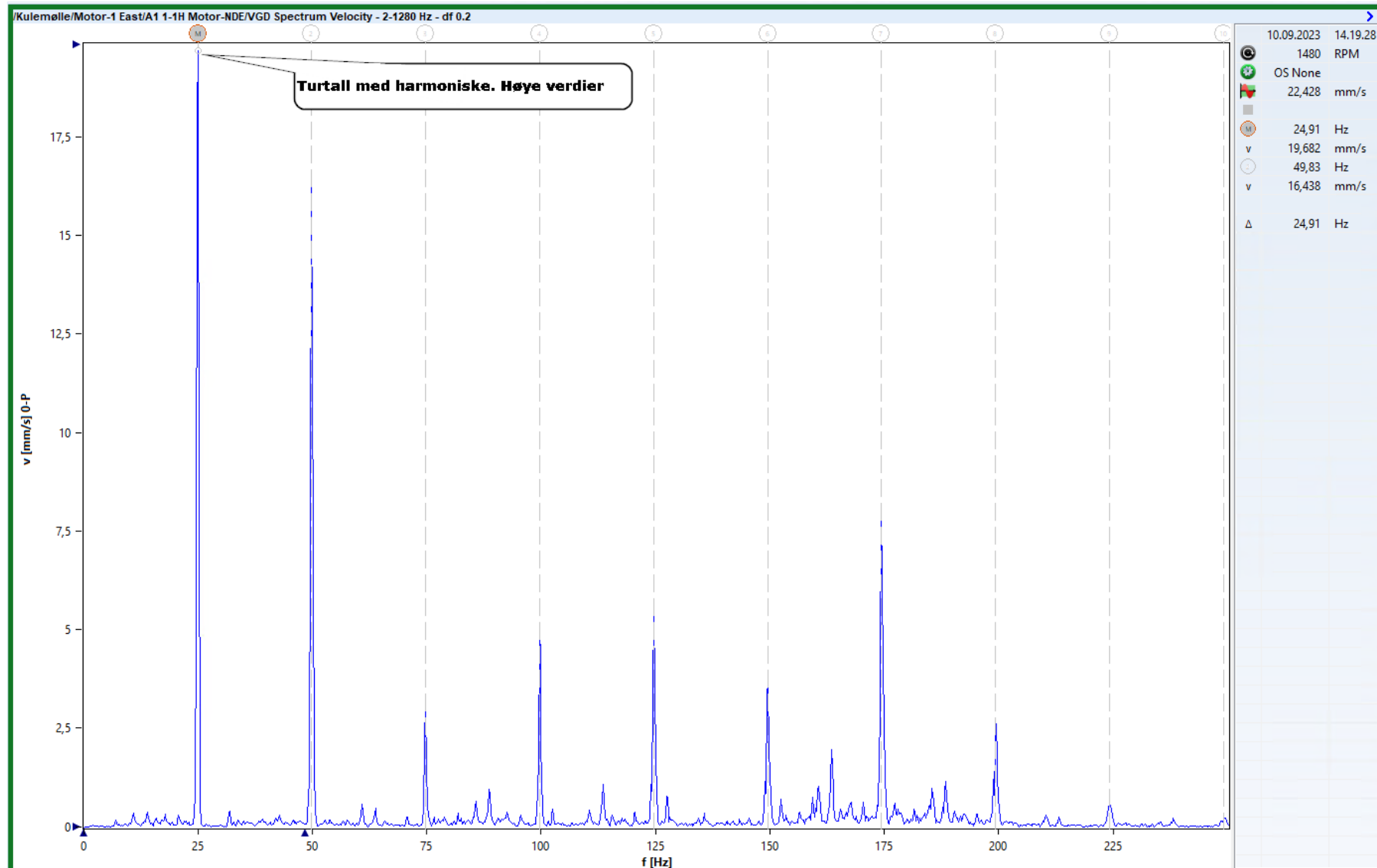


Drop in vibration after bearing housing was tighten !!!

Case study - Ballmill, 2023



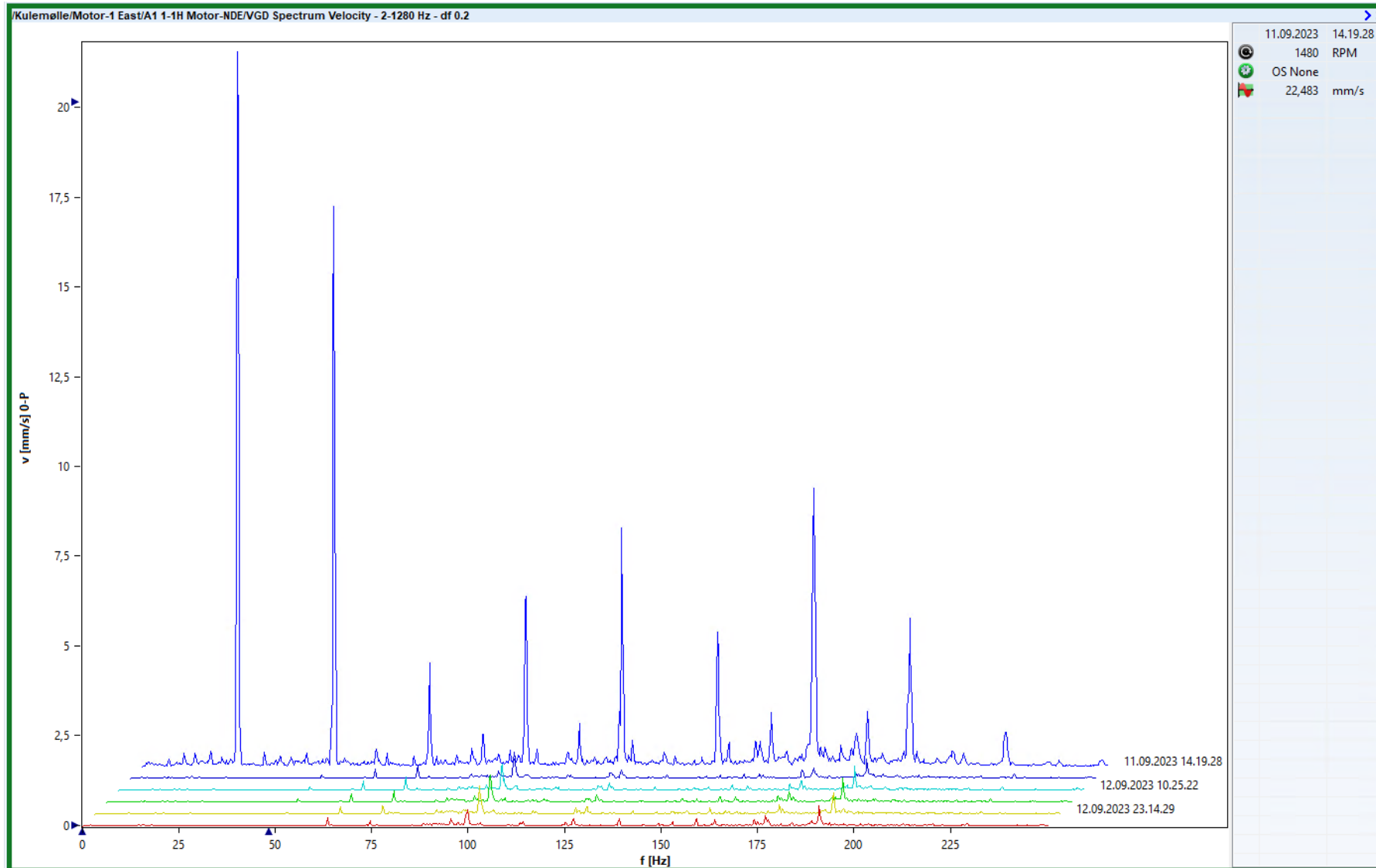
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Case study - Ballmill, 2023



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If breakdown:

- ✓ Production downtime of ??-days.
- ✓ Repair of motor or new motor. ?

Saved by online monitoring:

- ✓ Tightening the bolts.
(30 minutes by mechanic. No extra cost)

A mild estimation is minum 1 million NOK.

NOTE""""HUGHE POTENTIAL OF CATASTRPHICAL FAILURE""":

If the bearing housing would come completely loose, the rotor of approx. 1 tonn would drop directly into the stator at a speed of 1500 RPM. These are High voltage motors (6000V) and this would be dramatic. In worst case this could cause fire.