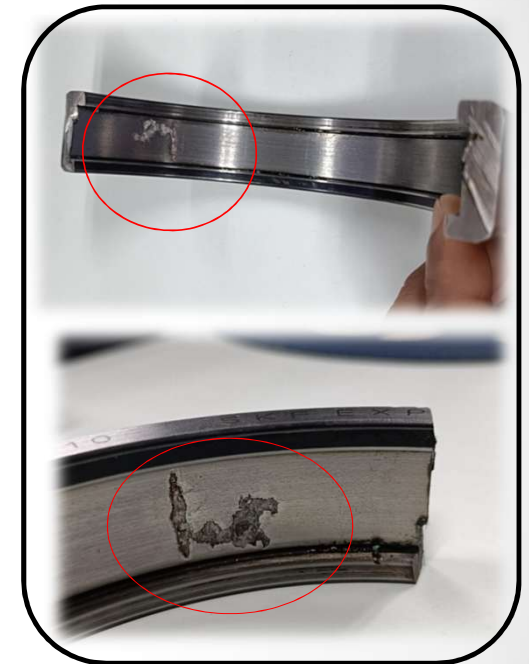


SDT ULTRASOUND SOLUTION INDIA PRIVATE LIMITED

Case Study

Bearing Fault Identification

Analyst: Samarjit Behera
Methodology: Ultrasound Technology
Device: SDT 340
Site: [REDACTED] Limited



EQUIPMENT DETAILS

Equipment Name	FEED PUMP
KW	490
Voltage	6600
RPM	2955
Criticality	C- Potential Trouble
NDE Bearing	NU216EMCCG75E
DE Bearing	NU216EMCCG75E/6216C3



Description:

The [redacted] is a high-speed feed pump in the petrochemical PTA plant, responsible for maintaining continuous feed flow to the reactor system. Given its critical role in process stability and overall plant productivity, any malfunction can directly impact production efficiency. However, the system is equipped with standby spares to ensure uninterrupted operation during maintenance or fault conditions.

MNDE BEARING INFORMATION

Bearing No:	NU216EMCCG75E
Bearing Type:	Cylindrical Roller Bearing
Manufacturer:	SKF
Used Grease:	Polyrex EM



The NU216 EMC is a **single-row cylindrical roller bearing** designed for high radial load applications. It features a **machined brass cage (EMC type)**, offering durability, heat resistance, and suitability for high-speed operations. The bearing's **NU design** allows axial displacement of the shaft, making it ideal for non-locating positions in machinery.

For lubrication at MCPI, the **recommended grease** is **Polyrex EM**, a high-performance electric motor bearing grease known for its excellent thermal stability and long service life. As per **OEM guidelines**, the **re-greasing interval is 22 days** under normal operating conditions.

INITIAL OBSERVATION

- Equipment has been under observation since **November 2024**.
- **Bearing fault frequency (BPFO)** was detected with **moderate energy** during early observation.
- A **gradually increasing trend** in ultrasound signal has been observed over time.
- **Change in tonal quality** has been noticed, indicating progressive fault.
- The **amplitude of bearing fault frequency (BPFO) peaks** is increasing steadily, confirming fault development
- As the equipment spares available we continued trend monitoring to access the fault progression before taking corrective action.



ANALYSIS & RECOMMENDATION

SATUS	POINTS	ANALYSIS	RECOMMENDATION
Alarm Stage	MNDE & MDE	In Ultrasound schedule inspection, we noticed the presence of abnormal sound at MNDE side and further analysis done and we found: ◆ Presence of very high energy signal in the dynamic data at MNDE side. ◆ Gradually increasing static trend value at both side bearing. ◆ Close to BPFO@383.1 Hz (non-synchronous) peak harmonics noticed with very high energy. ◆ FTF peak harmonics also noticed at both side bearing. ◆ The energy/amplitude of the signal is very high at MNDE side bearing. Above data suggesting bearing issue at MNDE side.	It is recommended to inspect and replace the MNDE bearing in closest available opportunity to prevent catastrophic failure.

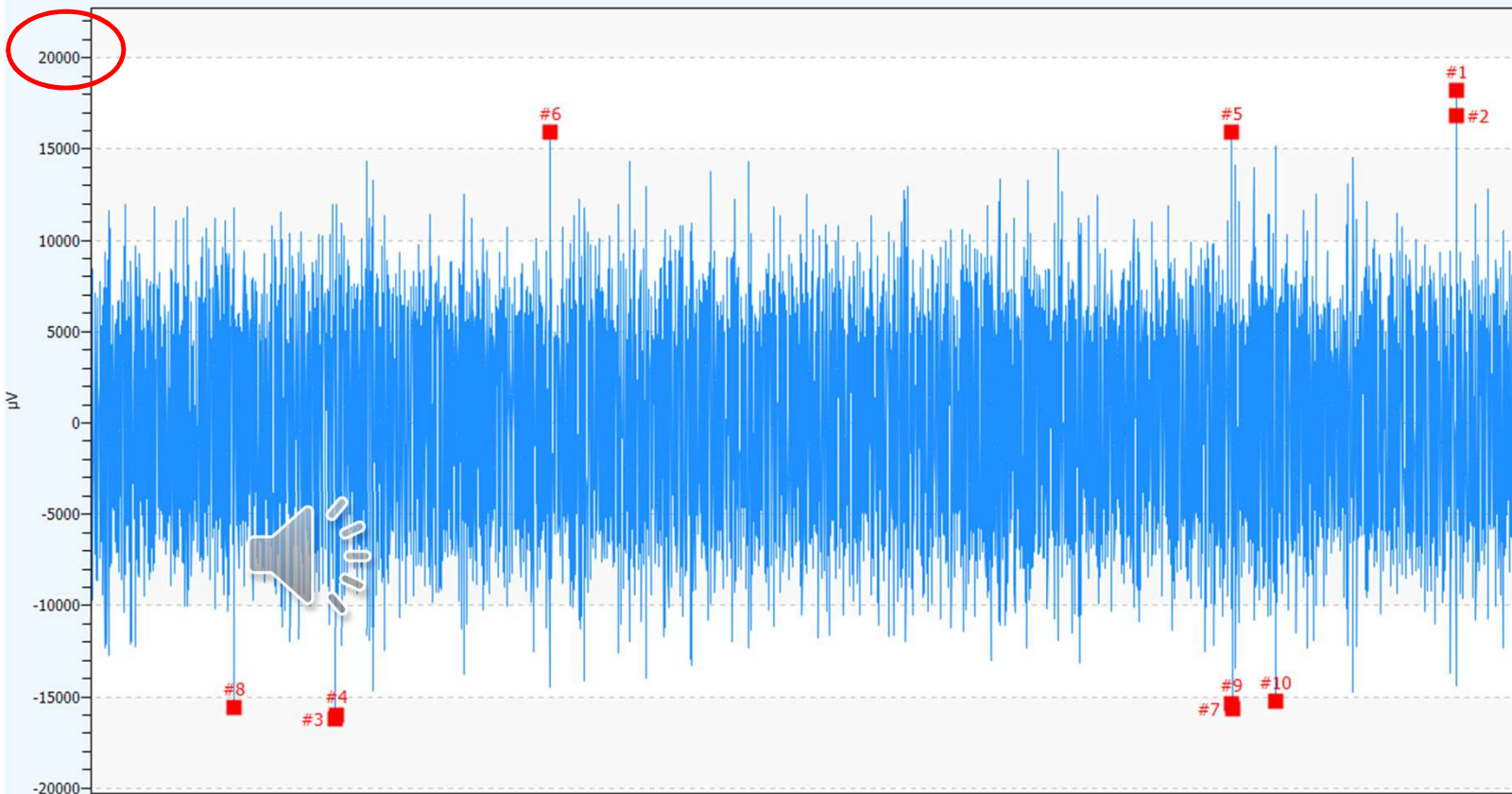
ANALYSIS BY:	Samarjit Behera
DATE:	16-06-2025

TIME WAVEFORM(MNDE)

0.0, 17972.6

Play

MCPI/HP/PTA/PTA (C)/2P-2211C/NDE
Bearing: SKF - NU216



Indicators

US RMS	70.25 dBµV
US max RMS	70.63 dBµV
US Peak	85.2 dBµV
US Crest Factor	5.59

Highest Peaks

- ☒ Treat all values
☐ Treat only positive values

#1	4.793 s	18201.16 µV
#2	4.793 s	16825.55 µV
#3	0.859 s	-16206.92 µV
#4	0.862 s	-15995.44 µV
#5	4.007 s	15953.93 µV
#6	1.614 s	15912.43 µV
#7	4.007 s	-15637.7 µV
#8	0.504 s	-15574.46 µV
#9	4.007 s	-15374.83 µV
#10	4.161 s	-15236.48 µV

Single cursors

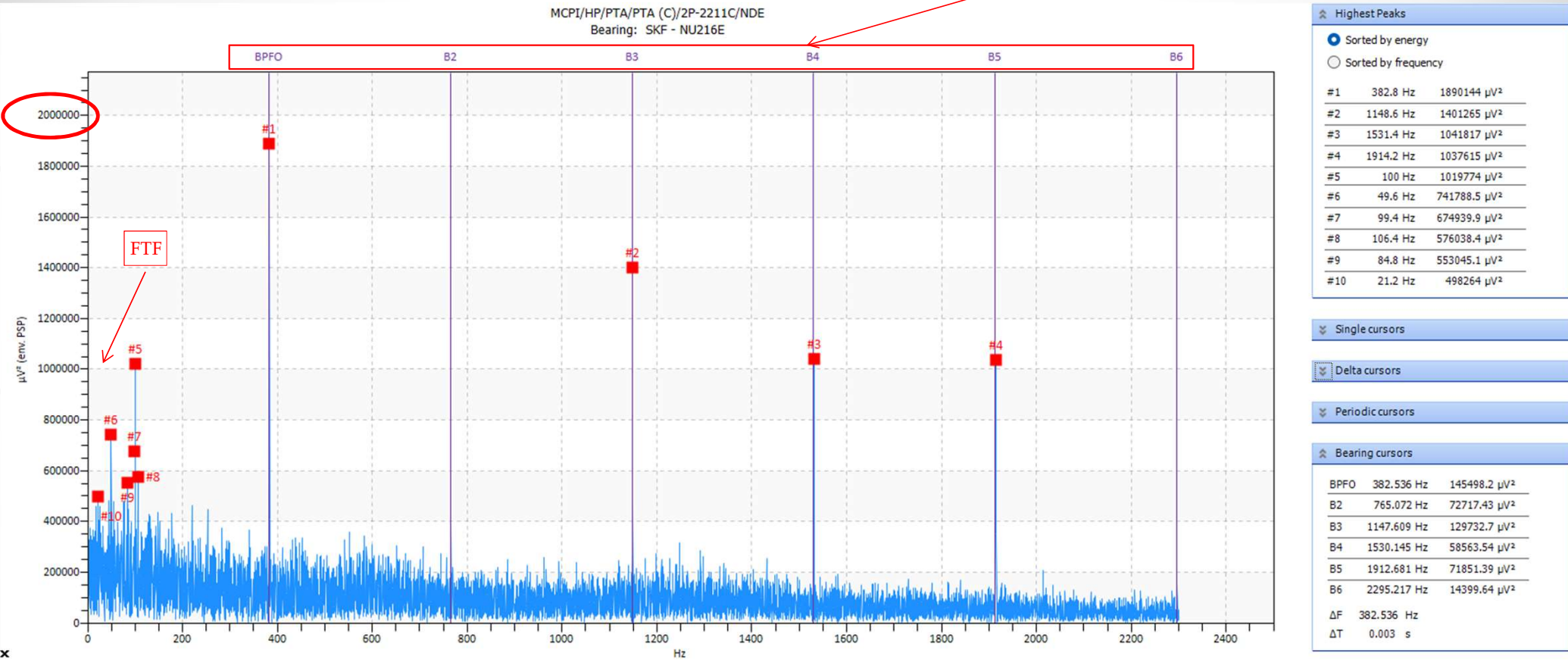
Delta cursors

Periodic cursors

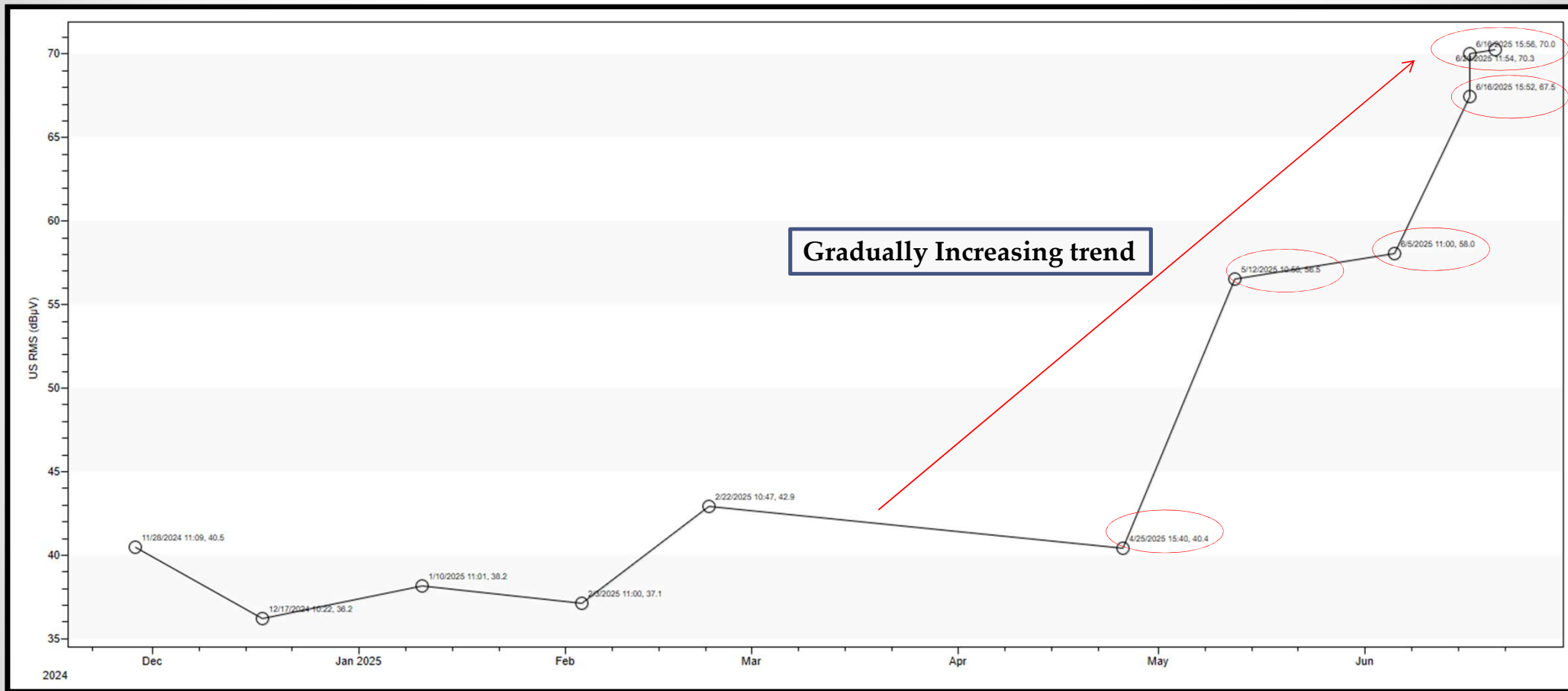
Bearing cursors

FFT SPECTRUM(MNDE)

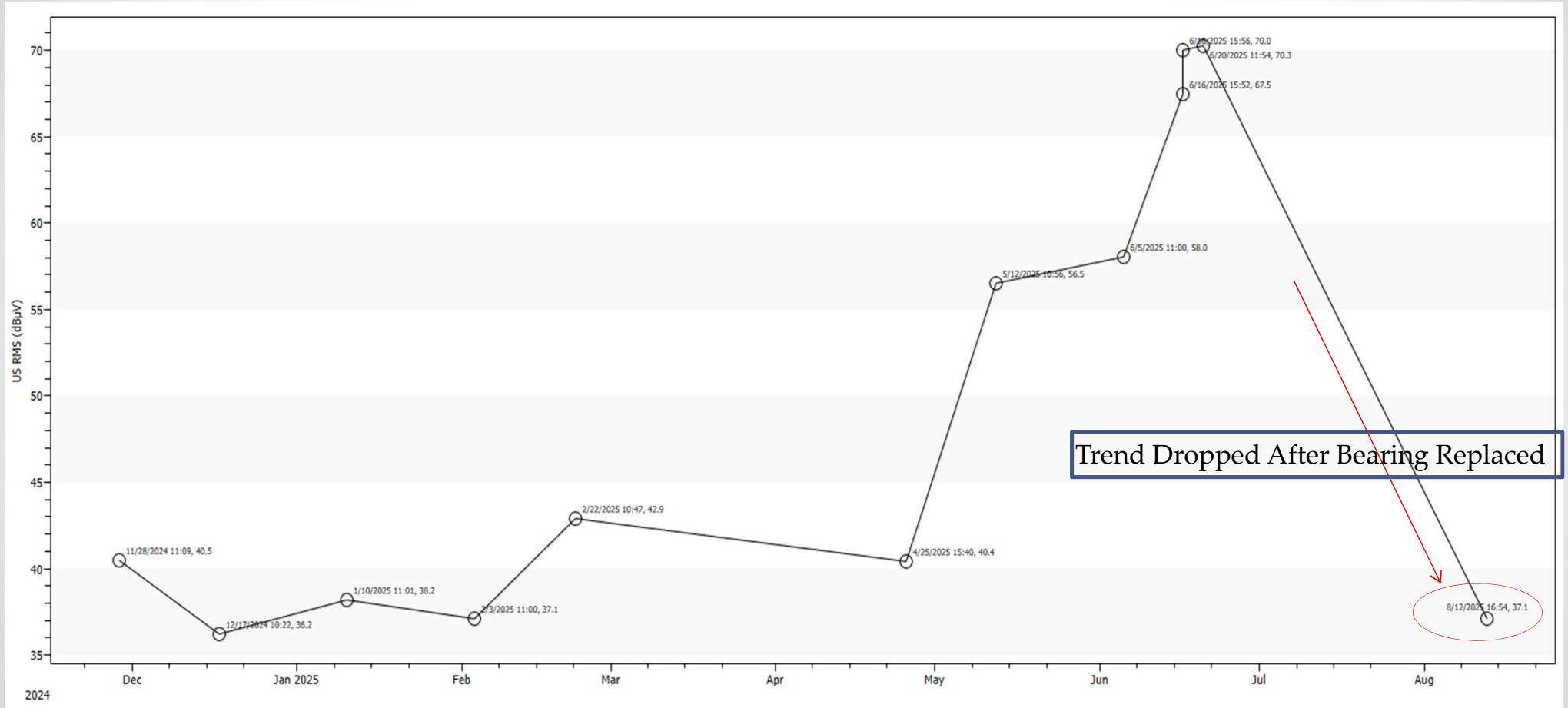
383.1 Hz harmonics



STATIC TREND(**Before** Bearing Replacement)



STATIC TREND(After Bearing Replacement)



VISUAL EVIDENCE OF BEARING DAMAGE

Severe Spalling And Pitting Observed On Raceway

- **Flaking/Spalling** on the raceway surface – classic sign of fatigue failure.
- **Localized surface degradation and wear**, likely due to **inadequate lubrication** or **contaminated lubricant**.
- **Discoloration or deposits**, indicating **overheating** or **foreign particle ingress**.
- **Indentation and pitting** near the edge zone, possibly due to **improper alignment** or **overloading**.



ROOT CAUSE

Fatigue Failure

- Repeated cyclic stresses exceeded material endurance limit.

Possibly due to:

- Misalignment of bearing during installation.
- Excessive radial/axial load.
- Shaft deflection or poor housing support.

2. Lubrication Failure/Over Lubrication

- Over Lubrication/Insufficient film thickness between rolling elements and raceway.



Lubrication Data(SDT LUBExpert)

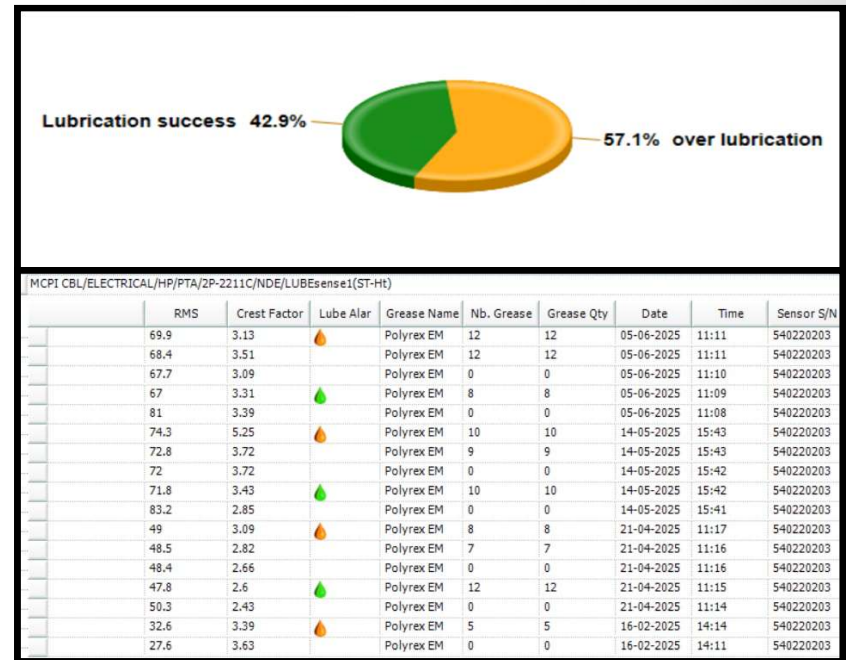
The attached LUBExpert report indicates that **57.1% over-lubricated** in [REDACTED] over the past five months—since the initiation of the LUBExpert program in [REDACTED]

This motor was lubricated on calendar-based(OEM). As part of **Phase 1** of our LUBExpert implementation, we are now using the SDT LUBExpert to observe the lubrication results.

This high rate of over-lubrication is a **significant contributing factor to accelerated bearing deterioration**.

To address this issue, we plan to **implement Condition-Based Lubrication (CBL) strategy** as part of our **Phase 2** program, **scheduled to begin in August**.

This approach will help optimize lubrication practices and extend bearing life.



THANK YOU