



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 11, Issue 4, April 2022

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.118



9940 572 462



6381 907 438



ijirset@gmail.com



www.ijirset.com

Condition Monitoring of Slew Bearing in Stacker and Reclaimer using SPM HD Technology

Prabhakar¹, Sampath Neeli², Basudev Sahoo³, Ravi Chandra⁴

Tech Support Manager, SPM Instruments India Pvt.Ltd, Hyderabad, Telangana, India¹

Service Manager, SPM Instruments India Pvt.Ltd, Hyderabad, Telangana, India²

Senior Engineer, SPM Instruments India Pvt.Ltd, Hyderabad, Telangana, India³

Senior Engineer, SPM Instruments India Pvt.Ltd, Hyderabad, Telangana, India⁴

ABSTRACT:SPM HD Technology is revolutionizing SHOCK & VIBRATION monitoring. It uses patented digital signal processing algorithms to extract and enhance only the signals of interest, resulting in extreme sensitivity and unseen clarity. The presentation of disturbance-free condition data in high definition quality sets HD technology apart from conventional vibration monitoring, providing the most advanced visualization of vibration time signals and spectrums. In this paper SPM HD technology using Intellinova Parallel system with 16 channels, duotech sensors are used in the stacker and Reclaimer Application to find the faults in the slew bearing. SPM HD technology is suitable for monitoring of slew-bearing application and able to trend the bearing condition.

KEYWORDS: Condition Monitoring, Slew Bearing, Stacker, Reclamier, SPM HD Technology, Shock&Vibration.



I. INTRODUCTION

The patented SPM HD Technology is used in the field of condition monitoring on low-speed types of equipment. This technology is used to identify the condition of Rolling elements Bearings and this give the conditions of green yellow and red with different Range of RPM. Mostly this technology is Applicable to low-speed Equipment to Diagnosis of your faults. The SPM HD Bearing is shown in Figure (1)



Figure 1: SPM HD Technology

The surface mining and material handling machines, such as excavators, stackers, and stackers-reclaimers, are characterized by the relative size of the superstructure [1]. The main Operating function of a stacker in the material handling system is to stack materials like coal, iron ore, and other material. These materials are stored in different locations. The entire procedure is known as stacking and the material is removed and moved to another place is known as Reclaiming. The Stacker and Reclaimer are shown in the following Figure (2). Slewing Bearings are vital and critical components of the Stacker and Reclaimer [2]. Slew bearing consists subgroup of roller bearing and it is challenging task to effectively diagnose the combined failure and extract fault features of slewing bearings [3]. Using SPM Technology they maximize bearing performance and reduce the risk of Bearing failures.



Figure 2: Stacker and Reclaimer Operations

II. SYSTEM MODEL

The system used for identifying the problem in stacker and Reclaimer is Intellinova Parallel compact system with 08 channels Duotech. The total no of sensors installed on the slew bearing is 08No SPM Duotech Sensor. All the 8 sensors are located at an angle of 45° . Please refer to Figure (3) for the installation of sensors. For the location of the sensors please refer to Figures (4) and (5)

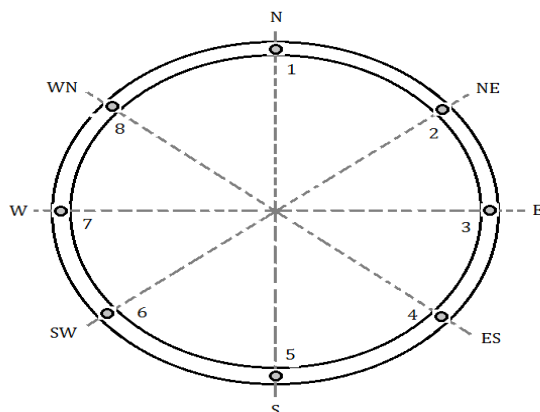


Figure 3: slew bearing sensors locations



Figure 4: slew Bearing

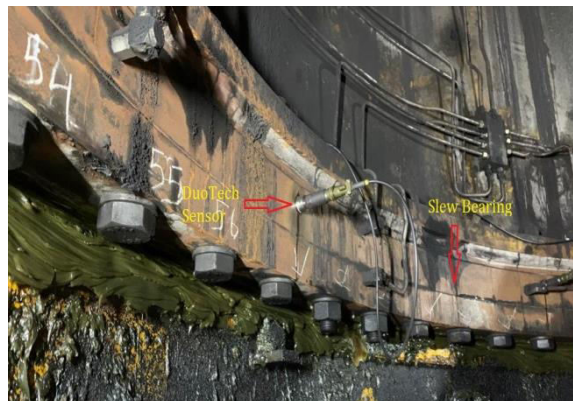


Figure:05 Duotech sensors location

III. METHODOLOGY

SPM India has setup SPM HD technology for low speed Applications. SPM HD Technology Monitoring the Bearing fault and detect with High Definition clarity. To identify the fault in the machine we follow some operation procedure.

1. Sensors setup:

Spm India has installed Intellinova system to monitor the slew bearing in the stacker Reclamier application by using SPM HD technology. We have installed Intellinova Parallel system with 08 channels Duotech (SPM Make). we have installed 8 duotech sensors on the slew bearing inner side. All the 8 sensors are located at an angle of 45° . Please refer Figure (6) for installation of sensors.

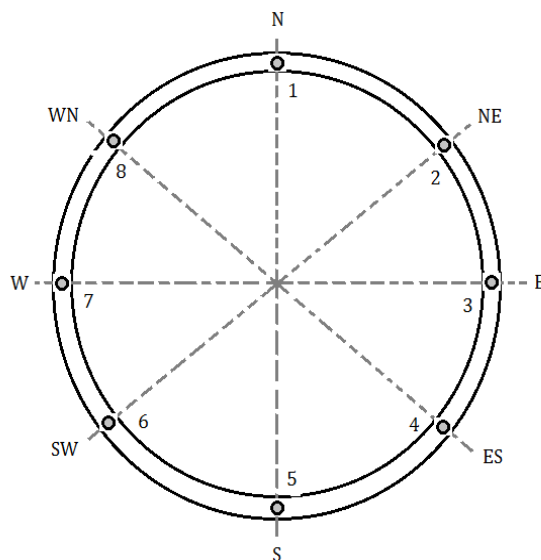


Figure: 6 Location sensors in stacker and Reclamier

2. Vibration Analysis:

.In this paper, the main focus is monitoring the slew bearing in the Stacker and Reclaimer. We are using SPM HD technology to identify the fault by knowing HDc and HDm values.

Where

HDm- High Definition Maximum

- High Definition Carpet value

HDm Indicates the mechanical fault and HDc indicates lubrication of the bearing. In this HDm the shock

value is the stronger signal in the bearing and HDc the shock value is weak signals in the bearing. HDm and HDc are evaluated based on the SPM patented technology.

Table 1.AnalysisScope

StackerReclaimer	
BearingDescription	Slew Bearing
WorkingArea	Raw material maintenance (coal)
RPM	0.1 to 2 RPM
Online System	Insen 8 Channel
Sensor	Duotech (SPMmake)

3. Condmaster setup:

Settings used in Condmaster Ruby 2020.4.3 are as follows.

Measuring technique SPM HD: -

Measuring time: As RPM is low. We are trending it.

Short/long time memory: Time signal and FFT

Upper frequency: 100 Orders

Lines in spectrum: 1600

Symptom Enhancement Factor: 5

Max RPM = 2

Min RPM = 0.1

IV. EXPERIMENTAL RESULTS

The stacking and Reclaiming process Graph is shown in Figure:7. According to the Graphical Trend, we are diagnosing the Condition of the slew-bearing.

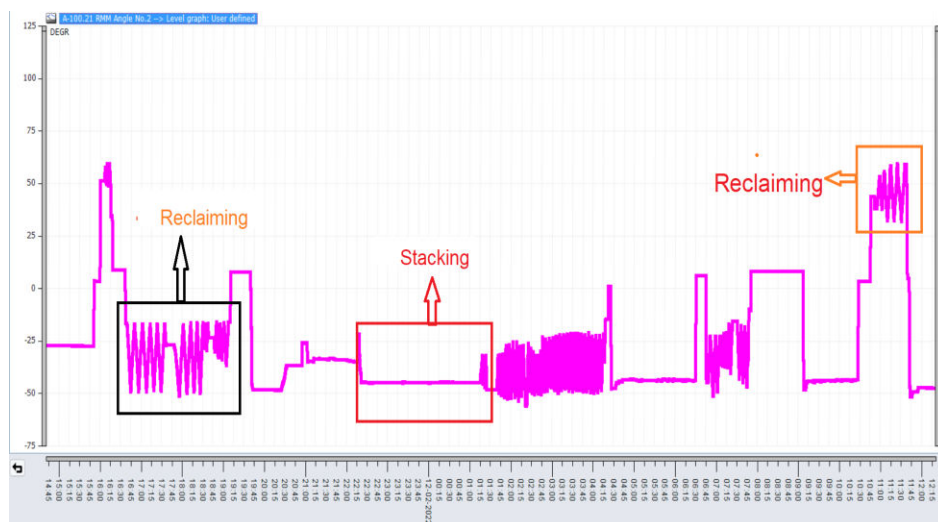


Figure:7 Stacking and Reclaiming

As reclaiming is having maximum movement of Slew bearing so we are collecting data in reclaiming operation. The movement (angle) of the slew bearing is captured by an encoder. And this data of the encoder is taken as input to the INSEN system. And is used for triggering the measurement.

We are triggering the condition of the bearing with respect to angle and the set condition is matched as shown in Figure 8.

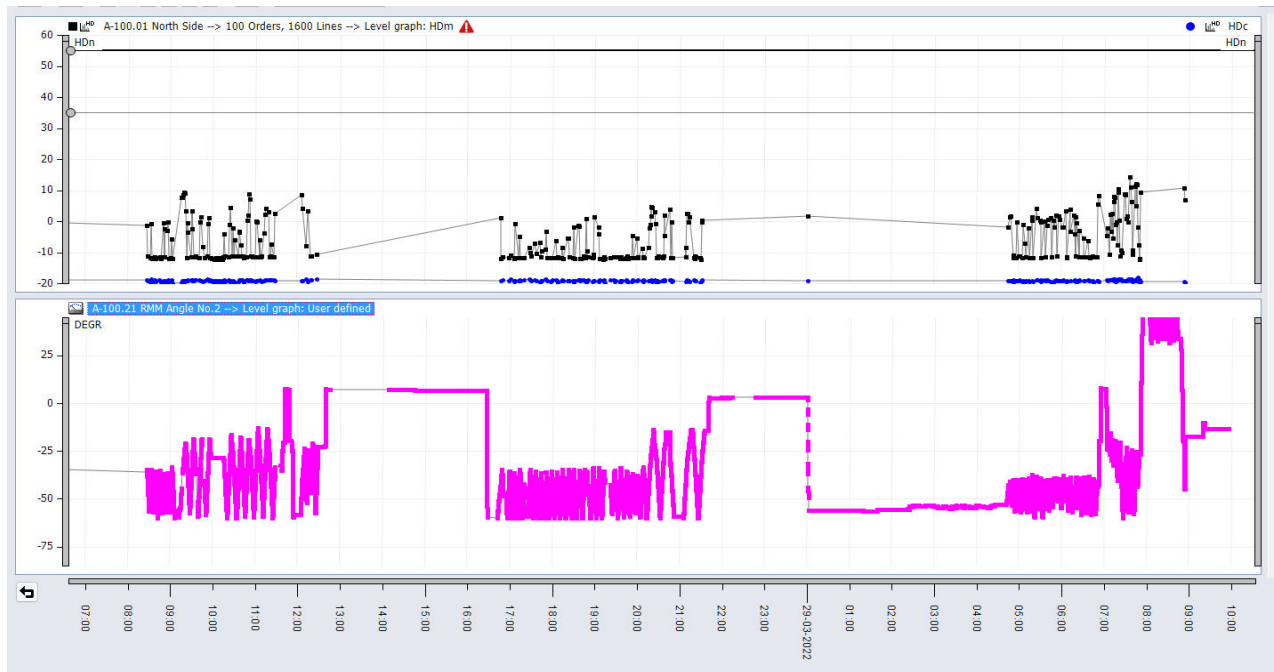


Figure:8 Data collected in reclaiming operation

The data collected once the angle condition is triggered as shown in Figure 9

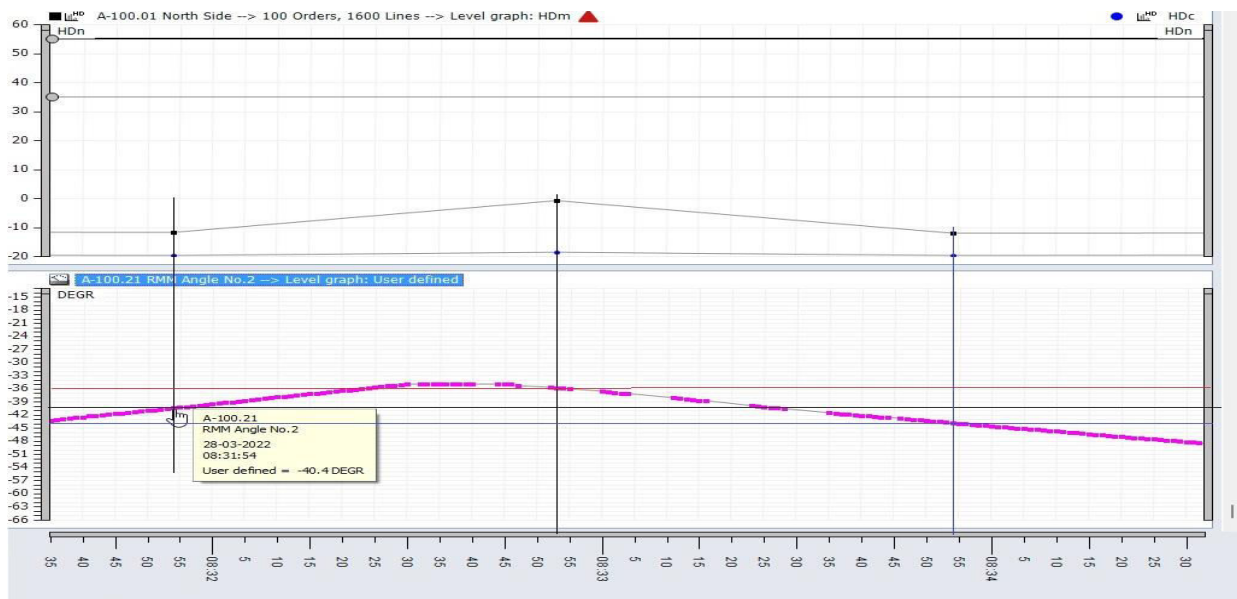


Figure:9 Condition Matched

There is a specific data observed while monitoring the trend of the stacker and Reclaimer slew-bearing is shown in Figure:10

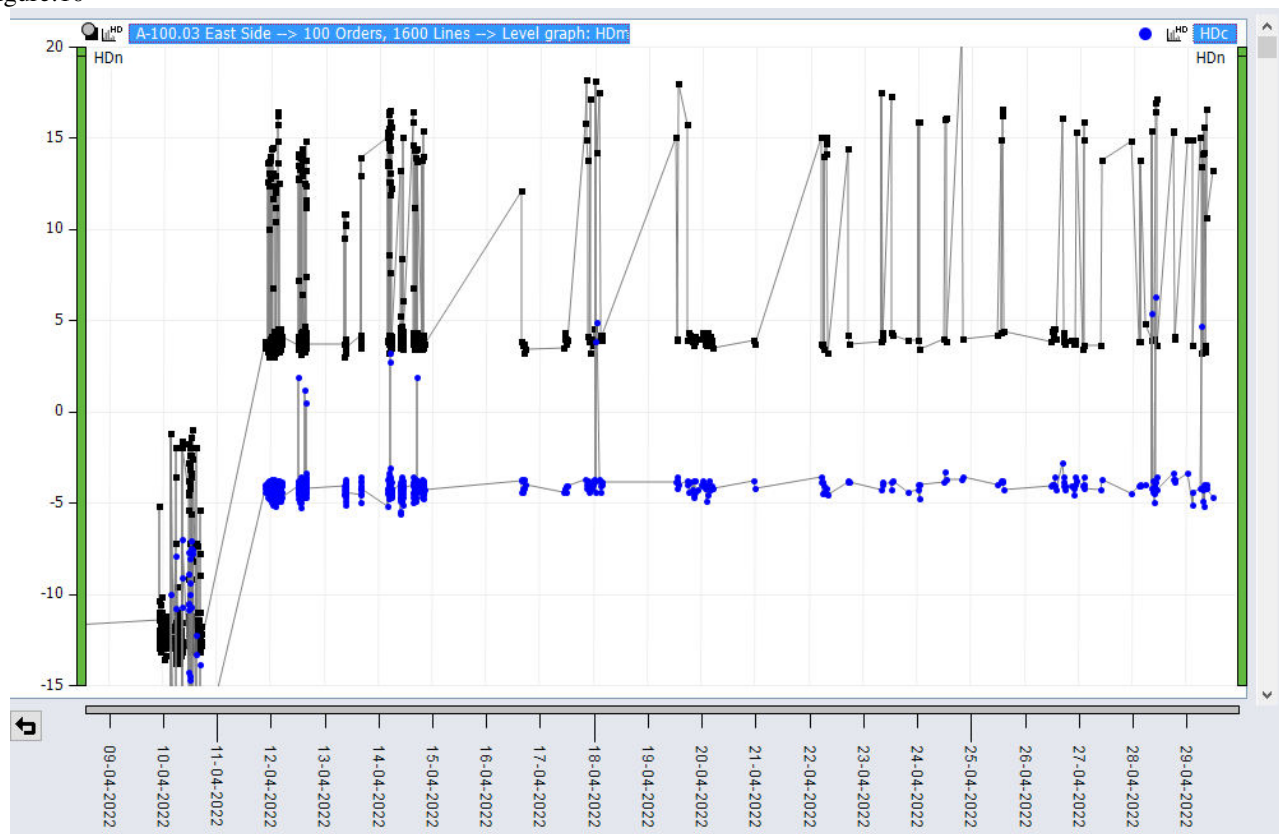


Figure:10 Data Trend

V. CONCLUSION

Concerning the above observations, the SPM HD technology is most and only suitable technology for monitoring slew-bearing applications in stacker & reclaimer (and other applications of slew bearings) and is able to trend the bearing condition. so, that we can have a long pre warning time of the bearing failure and have planned shutdown.

REFERENCES

- [1] . D. Pietrusiak, "The influence of superstructure vibrations on operational loads in the undercarriage of bulk material handling machine," elsevier.
- [2] . A. B. Sasongko, "Optimization Stacker Reclaimer Slewing Bearing Assessment in Mechanical Inspection Combining with Advance Technology of Vibration Analysis," 2021.
- [3] . F. Wang, "Combined Failure Diagnosis of Slewing Bearings Based on MCKD-CEEMD-ApEn," Hindwadi.



INNO SPACE
SJIF Scientific Journal Impact Factor
Impact Factor: 8.118



ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 **9940 572 462**  **6381 907 438**  **ijirset@gmail.com**



www.ijirset.com

Scan to save the contact details