



JPS Reliability

A Reliable Plant is a Profitable Plant

Case Studies #5

Reality towards Theory

Working with MIRCE Science

PROfessional services for PROactive maintenance



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INTRODUCTION

- ➞ This presentation is to showcase a selection of engineering issues from various clients we have worked with to determine the **Failure; Cause, Mechanism** and **Mode** in order to envision the elimination of common preventable failures
- ➞ Reliability Engineers and Maintenance Engineers/Teams have historically been separate entities and for a facility to be truly profitable there must be a science that links them
- ➞ We have been working with **MIRCE Akademy** to integrate the observed **Reality** and established **Theory**
- ➞ MIRCE Science is where the Theory is and the Reality is what the Maintenance and Condition Monitoring Teams observe daily in practice



CASE STUDIES

The integration of the **MIRCE Science Theory** and **JPS Reliability Reality** is illustrated through the following 6 case studies:

1. Electrical Motor Terminal Connection Defect
2. Standby Fan Motor Defect
3. Variable Frequency Drive Deterioration
4. Vibrating Screen Gearbox Bearing Defect
5. **4 Point Contact Bearing 23RPM Defect**
6. Dynamic Vibration Absorber

- Each slide we will discuss how the defect was detected and what actions were/were not put in place to protect the functionality of the system





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CASE 5

SLOW ROTATING BEARING



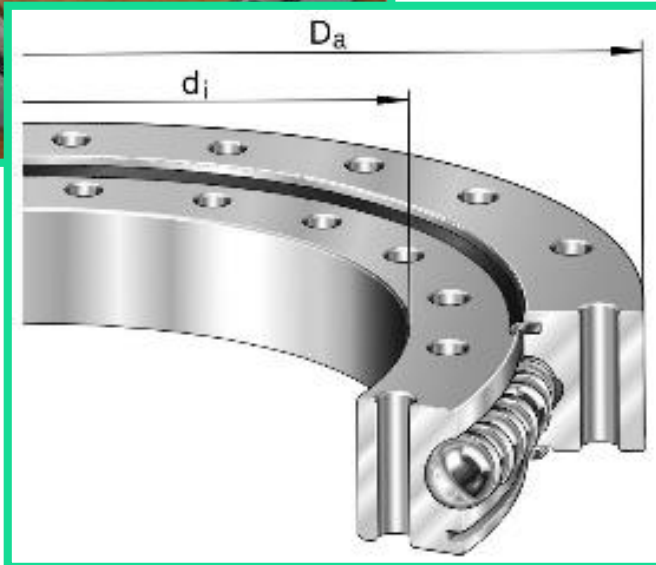
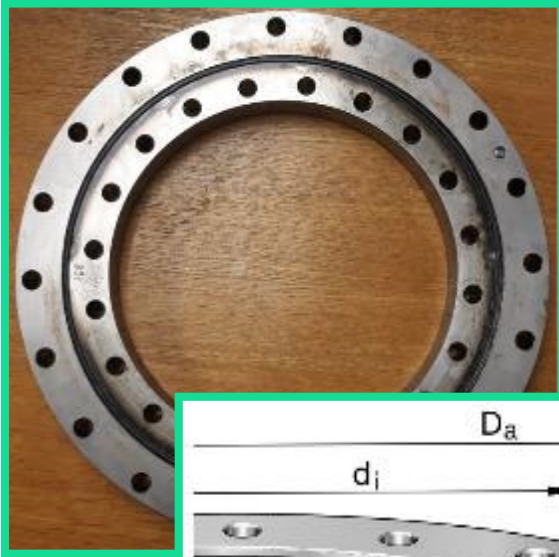
Slurry Pot



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CASE 5

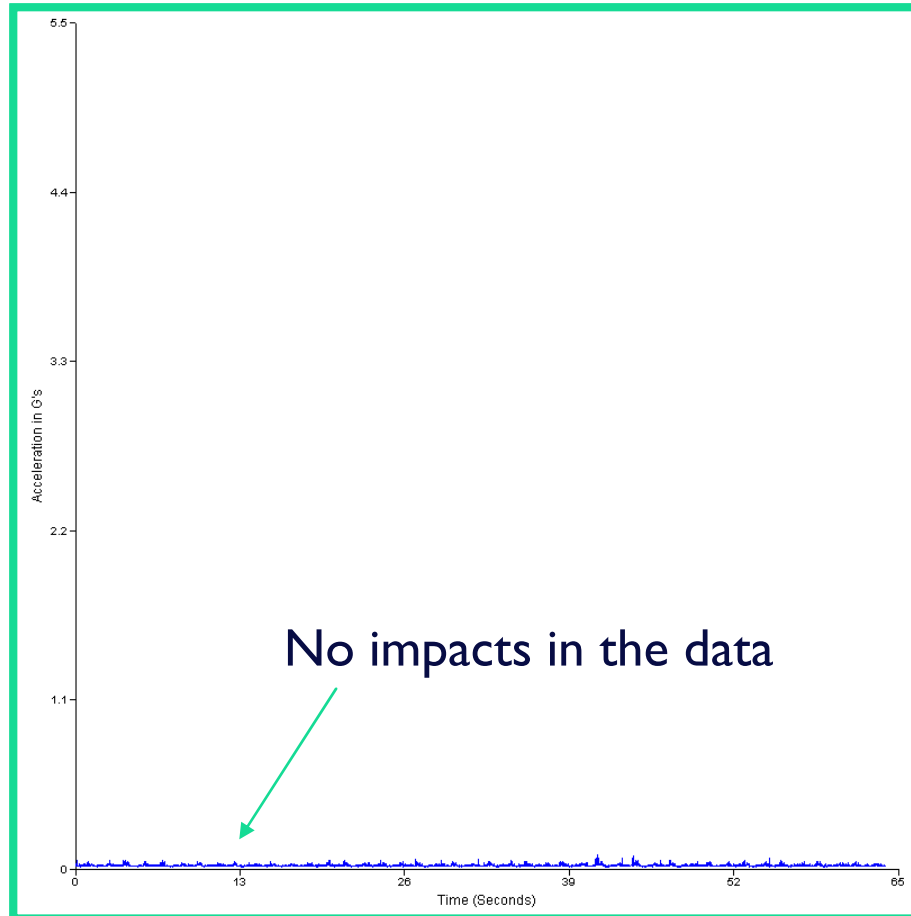
SLOW ROTATING BEARING



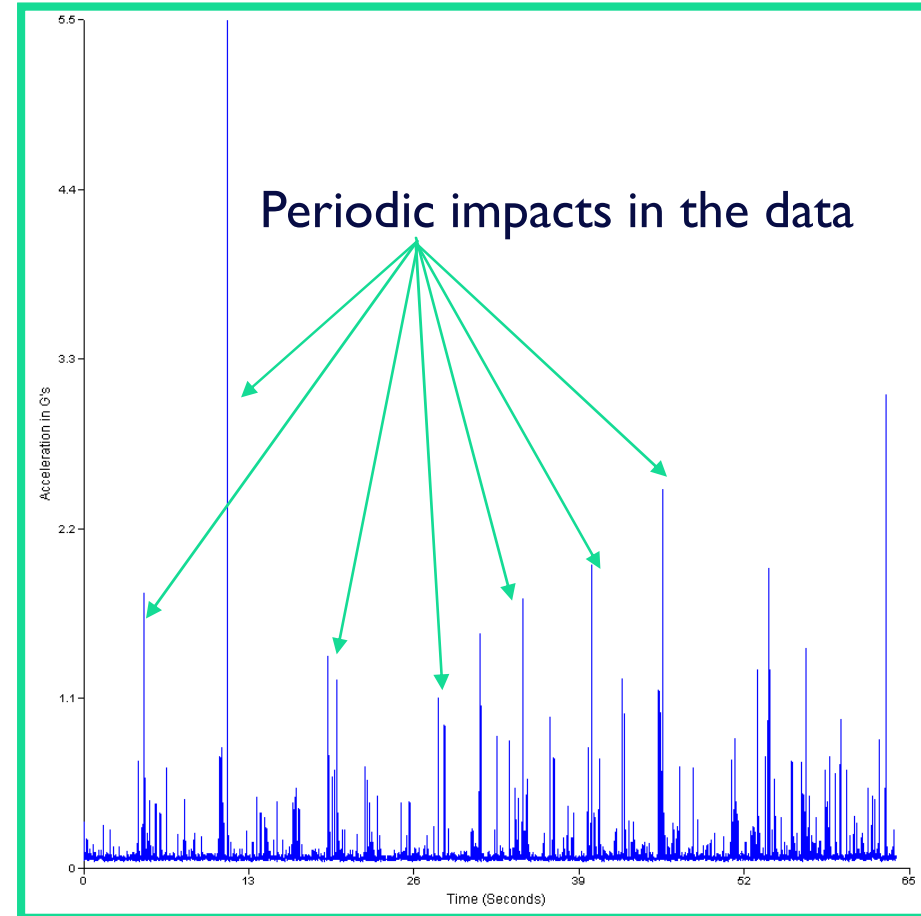


CASE 5

SLOW ROTATING BEARING – PEAKVUE TWF



Comparison bearing

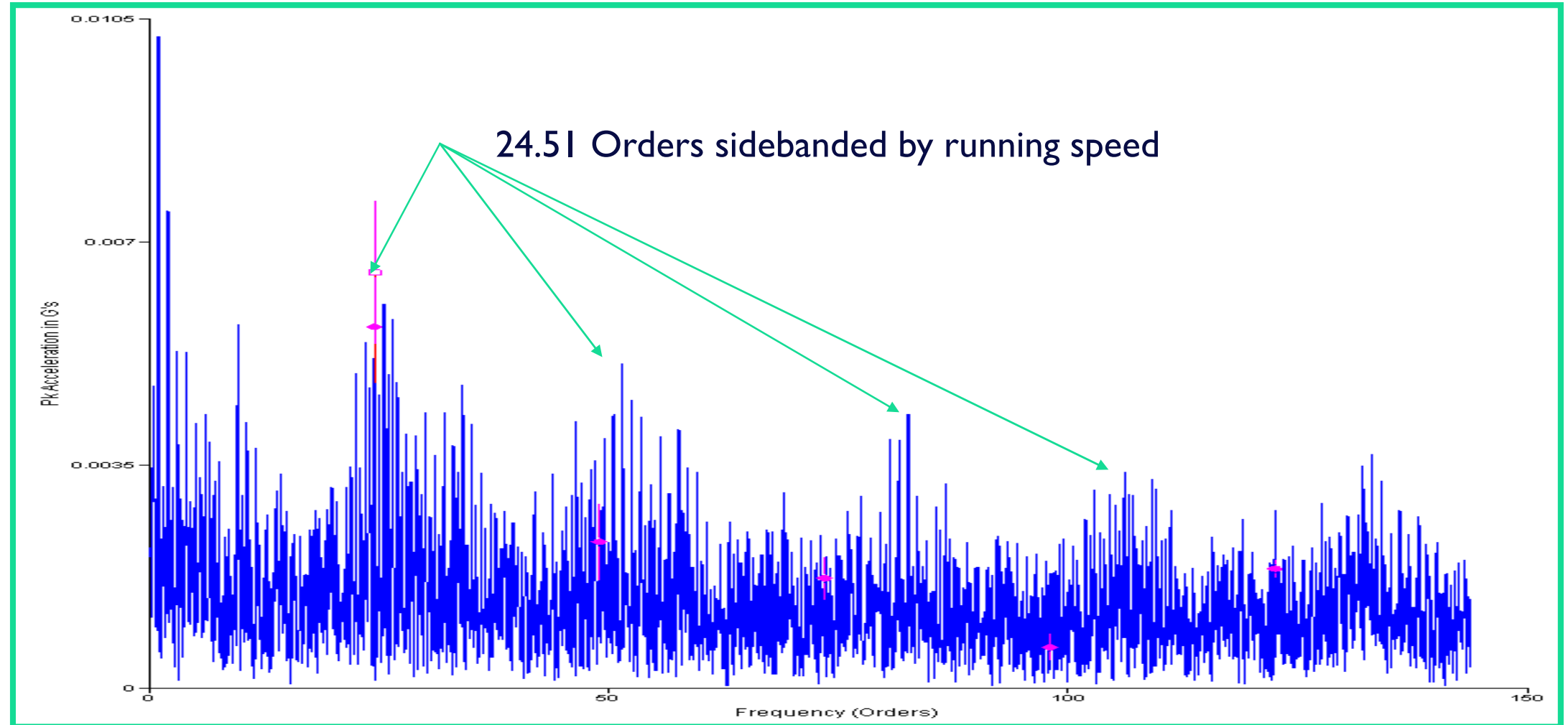


Suspected bearing defect



CASE 5

SLOW ROTATING BEARING – PEAKVUE DATA





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CASE 5

SLOW ROTATING BEARING - INSPECTION

- ➞ Once the bearing was split the outer races were moved to allow the rolling elements and cage pockets to be inspected as a whole



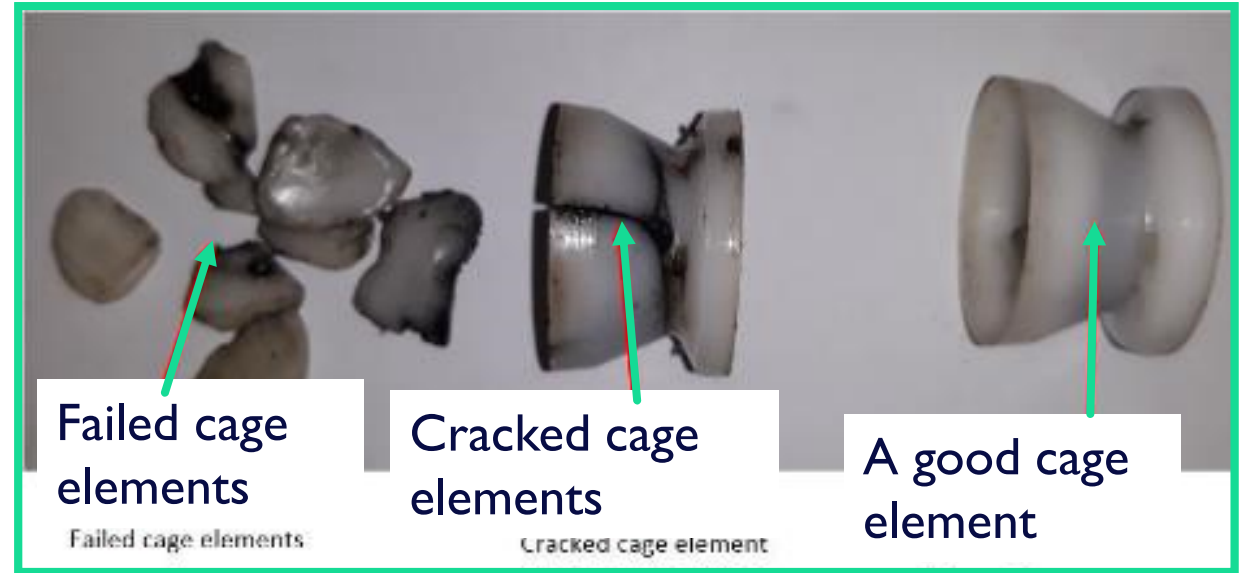
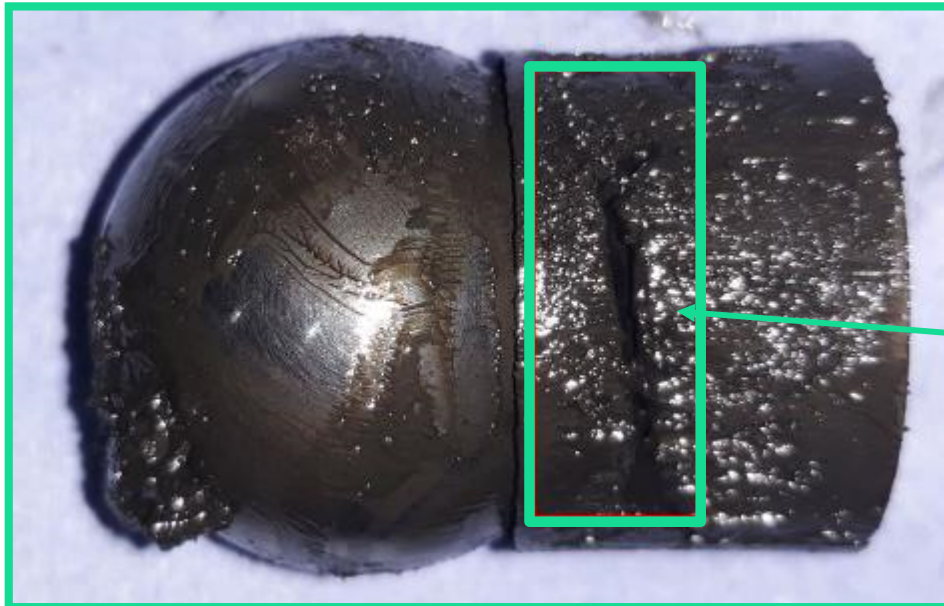
- ➞ On inspection there are many areas of bearing cage failure



CASE 5

SLOW ROTATING BEARING – INSPECTION CAGE

☞ This image shows the bearing cage pockets in the various stages of failure



☞ This image shows the cracked and failing bearing cage element

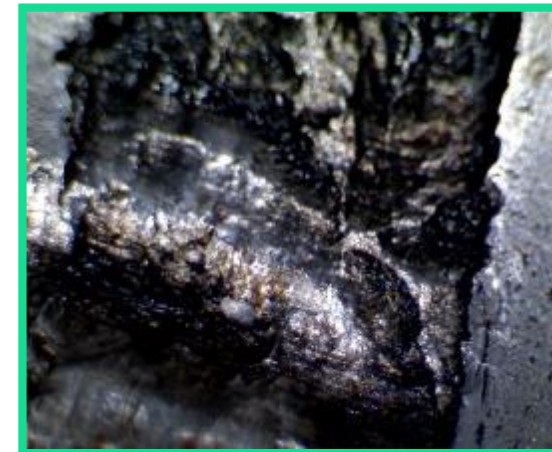
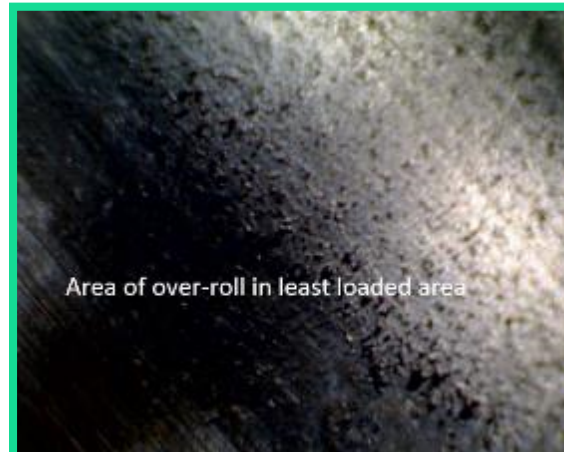


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CASE 5

SLOW ROTATING BEARING – INNER RACEWAY





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CASE 5

SLOW ROTATING BEARING – OUTER RACEWAY





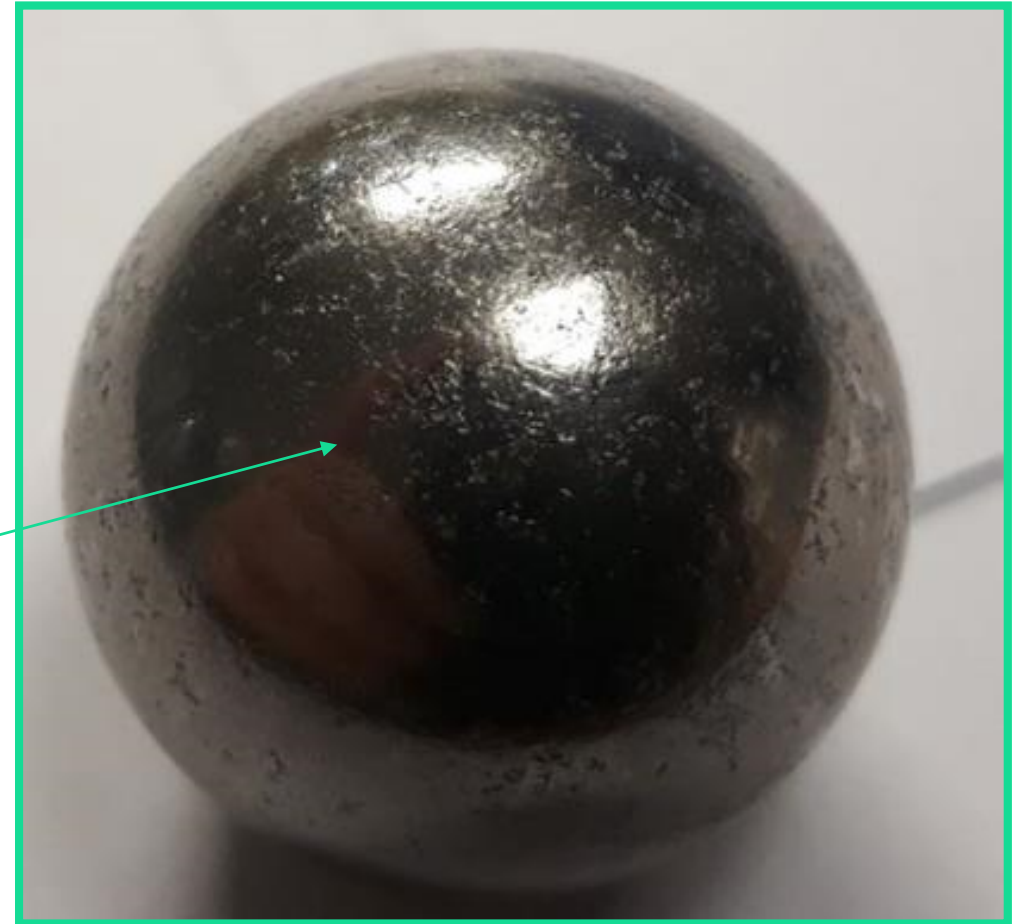
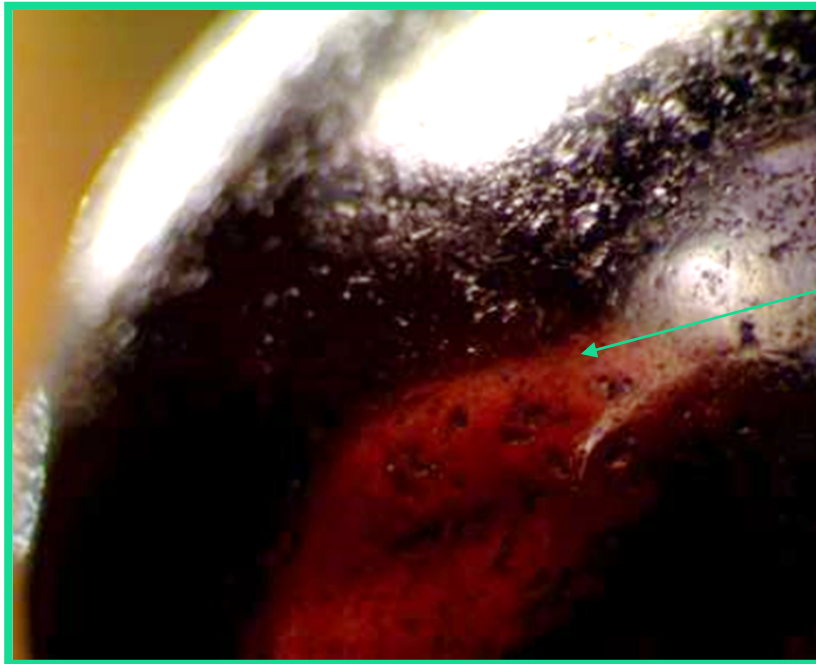
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SLOW ROTATING BEARING – ROLLING ELEMENTS

- ☞ The rolling elements display damage from over-roll of the spalled inner and outer raceways

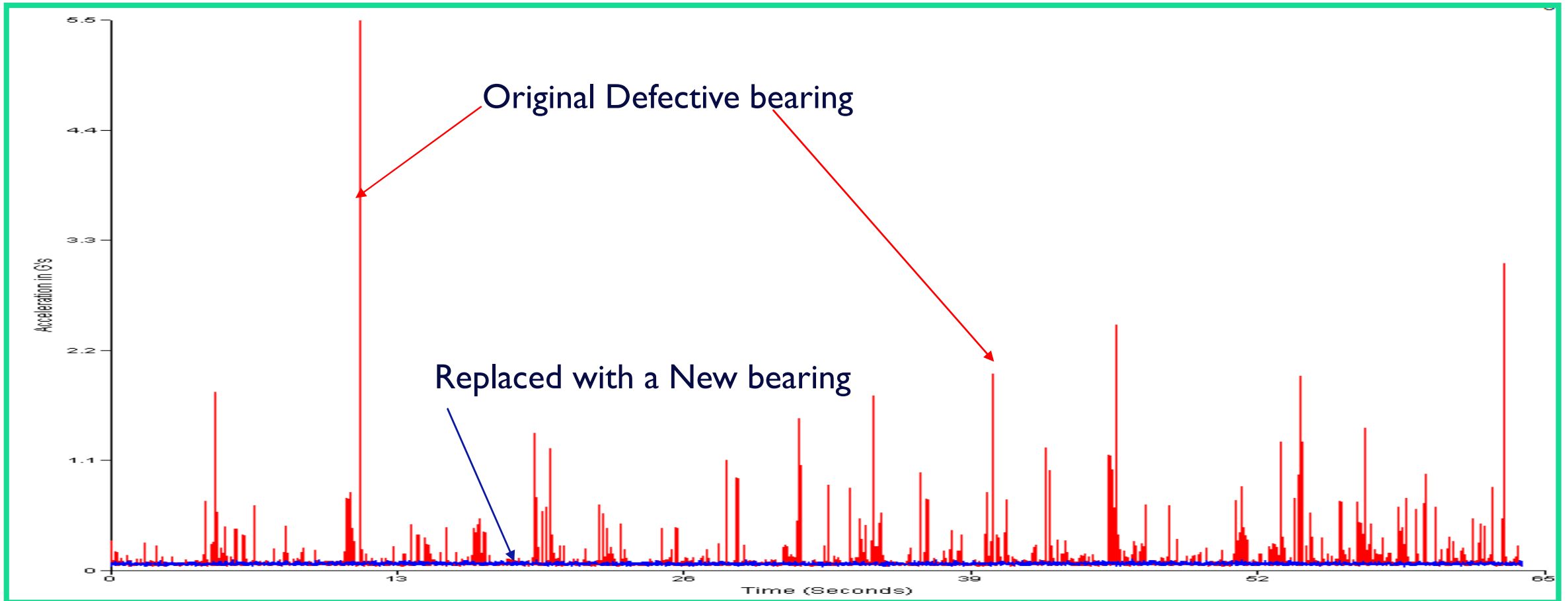




CASE 5

SLOW ROTATING BEARING – AFTER REPAIR

👉 PeakVue Time Waveform data comparisons of before and after bearing replacement





CASE 5

MIRCE EVALUATION

- ➞ The **Failure Cause** was **Lack of Lubrication due to Ineffective Lubrication System**
- ➞ The **Failure Mechanism** was **Additional Stress/Load on bearing raceways**
- ➞ The **Failure Mode** was **Vibration - Bearing Raceway Spalling**

Summary:

Due to a system design flaw the new lubrication was not getting all around the bearing, causing bearing surface and subsurface fatigue to the bearing raceway

This defect was detected and to avoid production losses, due to occurrence a Negative Functionability Event, through controlled changeout

Further more an improvement in the lubrication delivery system was proposed to remove this Failure cause



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HOW WE CAN HELP



When a business requires support with or development of Health Based Maintenance we work in partnership in;

Upskill your team with Practical Mentoring in

- Ultrasound Airborne and Structural Borne
- Infrared Thermography-Low Voltage, Mechanical and Process
- Vibration Analysis
- General Maintenance Practices
- Practical Reliability Engineering

Contracted Reliability Services

- Contemporary Condition Monitoring consultancy to assist clients with the management of their Health Based Maintenance program



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TECHNOLOGIES AND SERVICES

Vibration Analysis

Unbalance
Looseness
Resonance
Pump issues
Gear faults/wear
Inadequate lubrication
Bearings
Steam traps/valves

Lubrication

Gear faults/wear
Wrong oil/mixed
Oil degradation
Contamination
Fuel dilution
Leaking seals
Bearings
Overheating

Thermography

Bearings
Overheating
Steam traps/valves
Flammable gas leaks
HV issues
Electrical wiring faults
Heat exchanger blockage
Refractory applications

Ultrasound

Inadequate lubrication
Steam traps/valves
Bearings
Flammable gas / air leaks
HV issues
Corona discharge arcing
Heat exchanger tubes/plate



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ABOUT JPS RELIABILITY

Over 40 years' combined experience in the fields of Condition Monitoring, Practical Reliability Engineering and Maintenance Practices.

Worked with many of the Blue-Chip companies in the UK and Australia.

Our experiences ranges from Lubrication, Thermal Imaging, Vibration Analysis, Ultrasound, NDT, Maintenance Planning, Maintenance Improvements, Project Management and Mechanical Maintenance including on-site Dynamic Balancing and Laser Alignment.

We are qualified to ISO 18436-2 VA Level 3, ISO 18436-4 LM Level 2, ASNT-SN-TC-IA IRT Level 2, ASNT-SN-TC-IA UT Airborne Level I & Asset Reliability Practitioner Category I (ARP).

Registered with Engineers Australia in the Mechanical College, Engineering Council UK as Engineering Technician and with the British Institute for Non-Destructive Testing as an Associate Member.

Author of “ [Enhanced System Reliability Through Vibration Technology](#)” ISBN 978-1-5272-5386-5.



MIRCE SCIENCE APPROACH

The MIRCE Akademy is an independent institution engaged in scientific, educational, literary and professional endeavours to advance and apply the knowledge of MIRCE Science. Our contribution to engineering and management professions is the body of knowledge that is essential for designing and managing the life of working systems in a manner that delivers the maximum reliability and effectiveness, with the least possible investment in resources and impact on the environment.

MIRCE Science comprises of mathematical axioms, equations and methods that enable predictions of expected functionability performance of the future functionability system type to be done, based on the complex, time-dependent, interactions between physical properties of consisting components and applied functionability rules regarding operation, maintenance and support processes.

Dr Jezdimir Knezevic, Founder and President.

<http://www.mirceakademy.com>

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