

JPS Reliability

A Reliable Plant is a Profitable Plant

Case Studies #4

Reality towards Theory

Working with MIRCE Science

PROfessional services for **PRO**active maintenance



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 #4



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 4

GEARBOX DEFECT

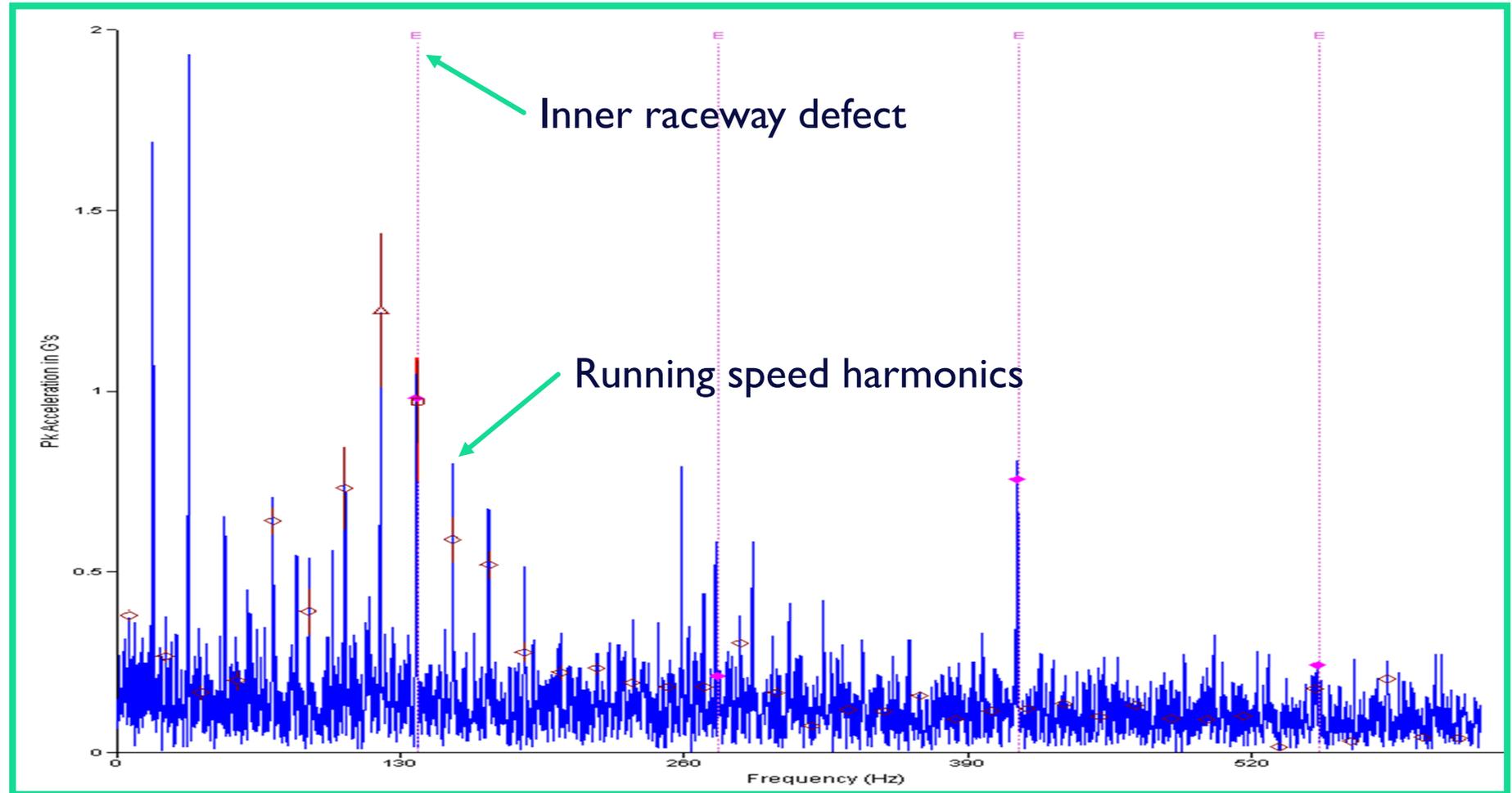


Image of an Exciter Gearbox from a vibrating screen

CASE 4

GEARBOX DEFECT – PEAKVUE

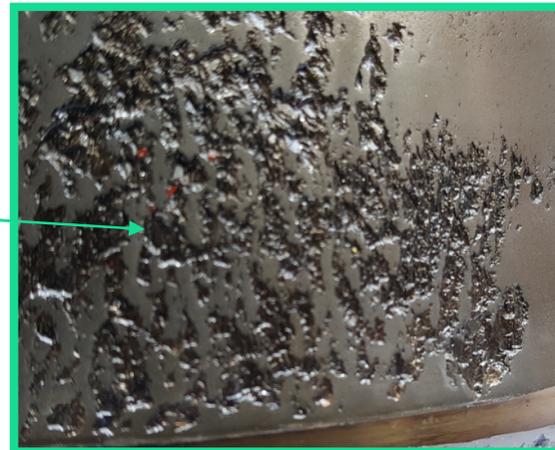
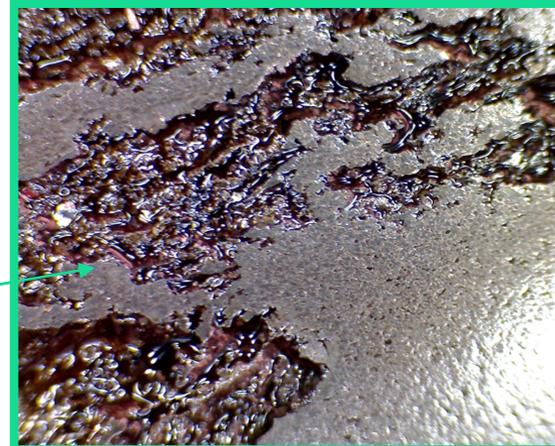
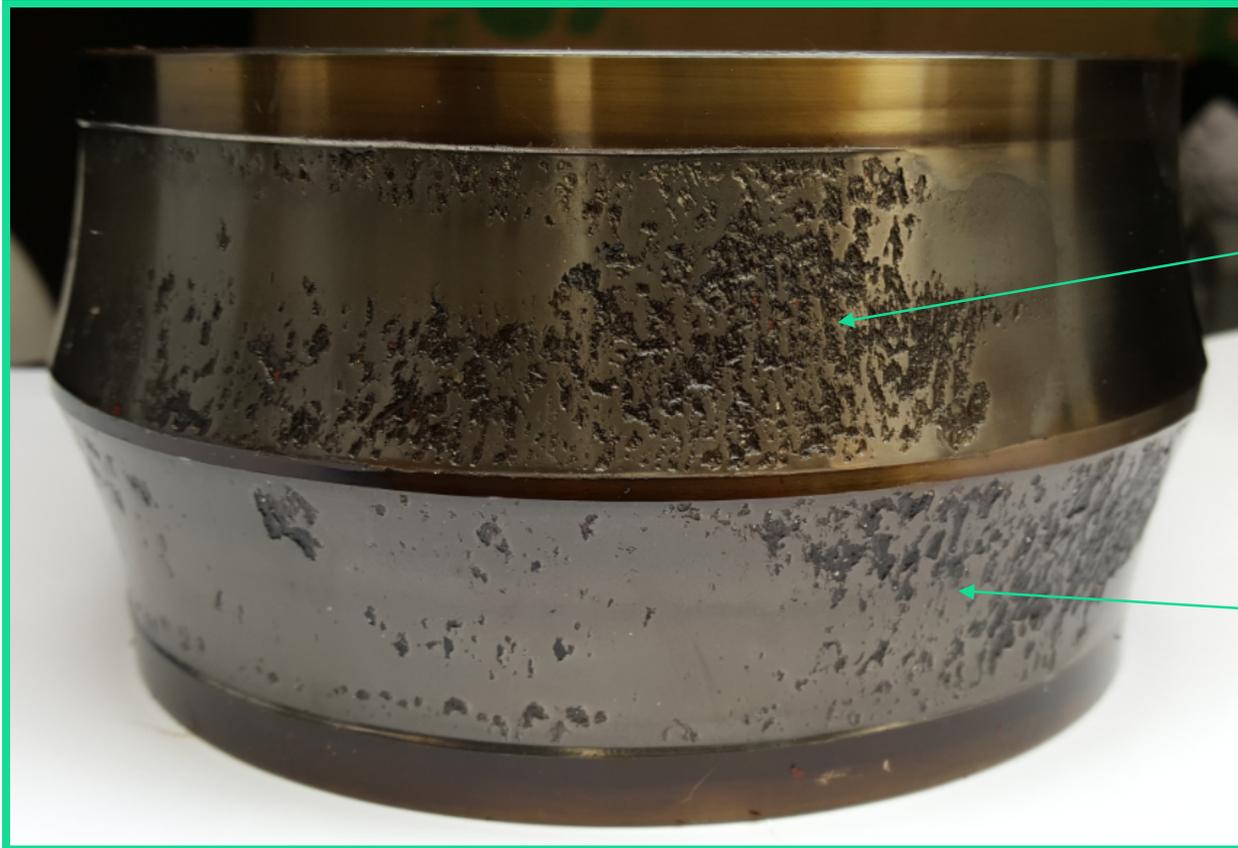
- Vibration data gathered on a random inspection indicated a critical inner race bearing defect in the gearbox
- This was pinpointed at the drive end bearing on the long drive shaft



CASE 4

GEARBOX DEFECT - FINDINGS

- ☞ The Inner raceway has very heavy pitting from probable excessive load and contamination carryover within the lubricant



CASE 4 GEARBOX DEFECT - FINDINGS

👉 The cage was found to be fractured and failed upon removal





CASE 4 MIRCE EVALUATION

- The **Failure Cause** was **Inadequate Lubrication**
- The **Failure Mechanism** was **Instantaneous Overload on Start-up**
- The **Failure Mode** was **Vibration, Inner Raceway Spalling**

Summary:

A random vibration inspection was initiated due to historical gearbox failures. This inspection detected this hidden bearing inner raceway defect.

A positive action to restore the functionality of the system was to replace the gearbox to avoid production losses.

In addition a superior lubricant was identified that would 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



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.

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