



JPS Reliability

A Reliable Plant is a Profitable Plant

Case Studies #1

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 #1



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

- **Electrical Motor Terminal Connection Defect**
 - Standby Fan Motor Defect
 - Variable Frequency Drive Deterioration
 - Vibrating Screen Gearbox Bearing Defect
 - 4 Point Contact Bearing 23RPM Defect
 - 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



CASE I

ELECTRICAL DEFECT - VELOCITY

- The overall Velocity Increased from a normal level of 1mm/s RMS to 3.9mm/s RMS and then in two days increased further to 8.88mm/s RMS
- The Velocity spectrum displayed a new peak at 100Hz

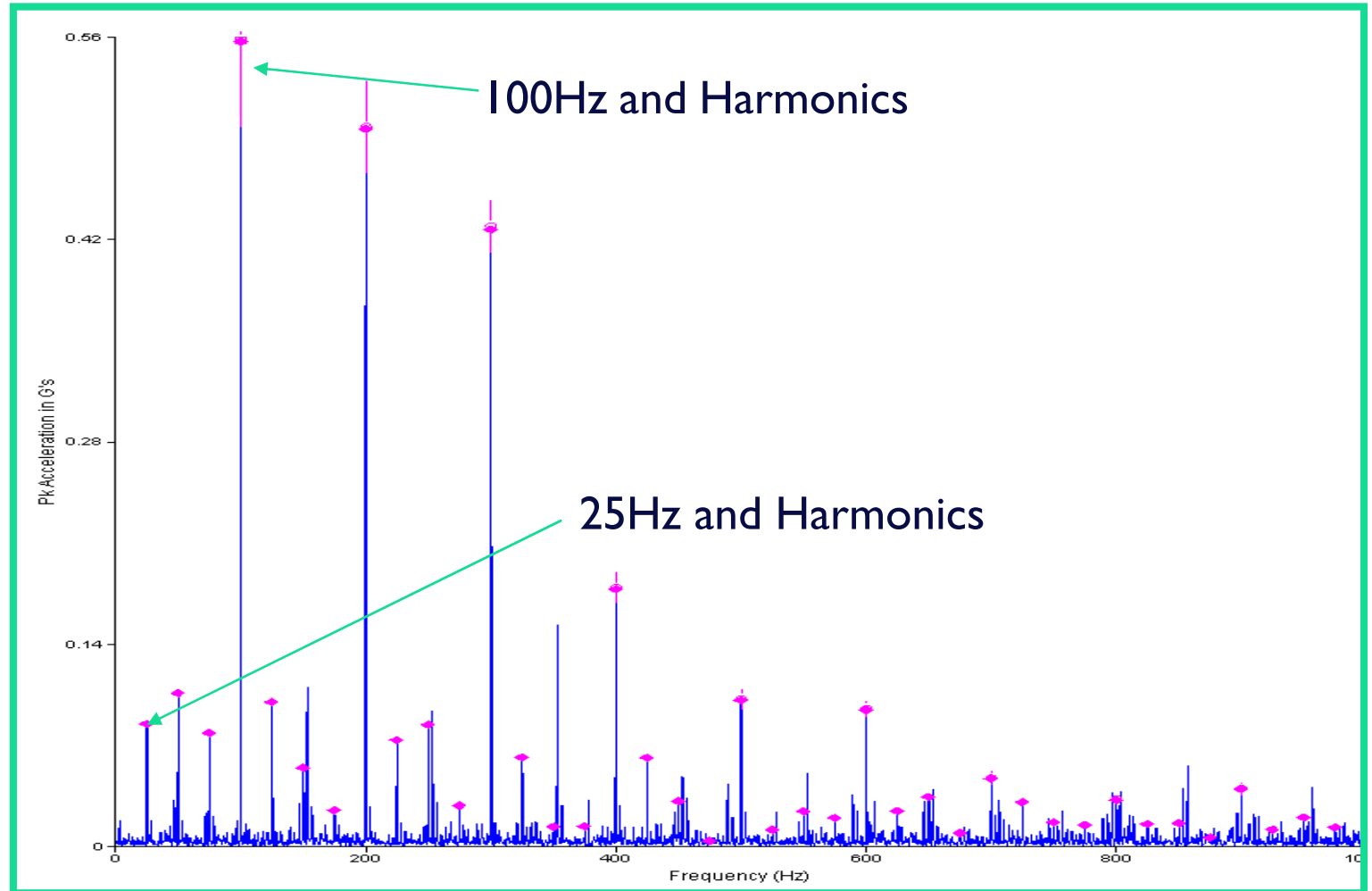




CASE I

ELECTRICAL DEFECT - PEAKVUE

- The PeakVue spectrum displayed dominant 100 Hz and harmonics
- There are additional lower 25 Hz activity with harmonics



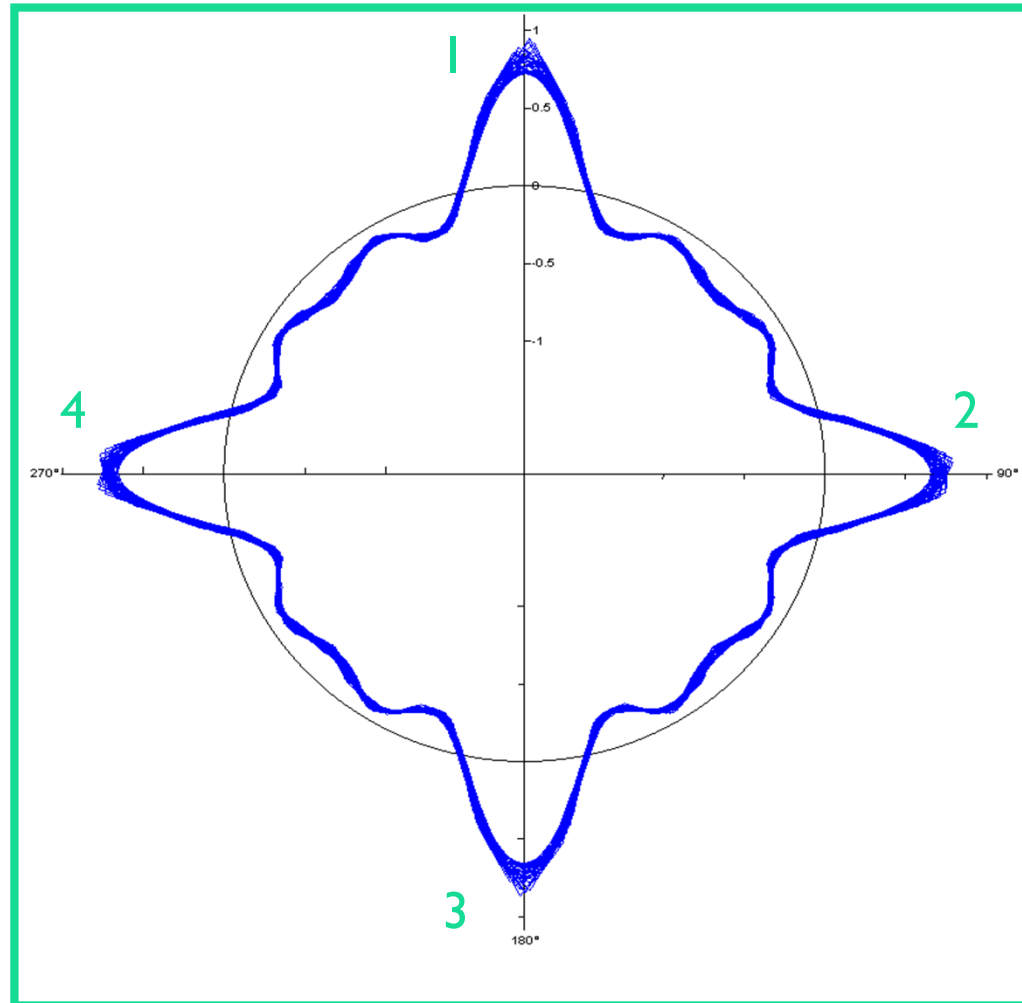


CASE I

ELECTRICAL DEFECT – CIRCLE PLOT

➡ PeakVue Acceleration Autocorrelation Time waveform circle plot showing 4 clear peaks

➡ This is a 4 Pole Motor

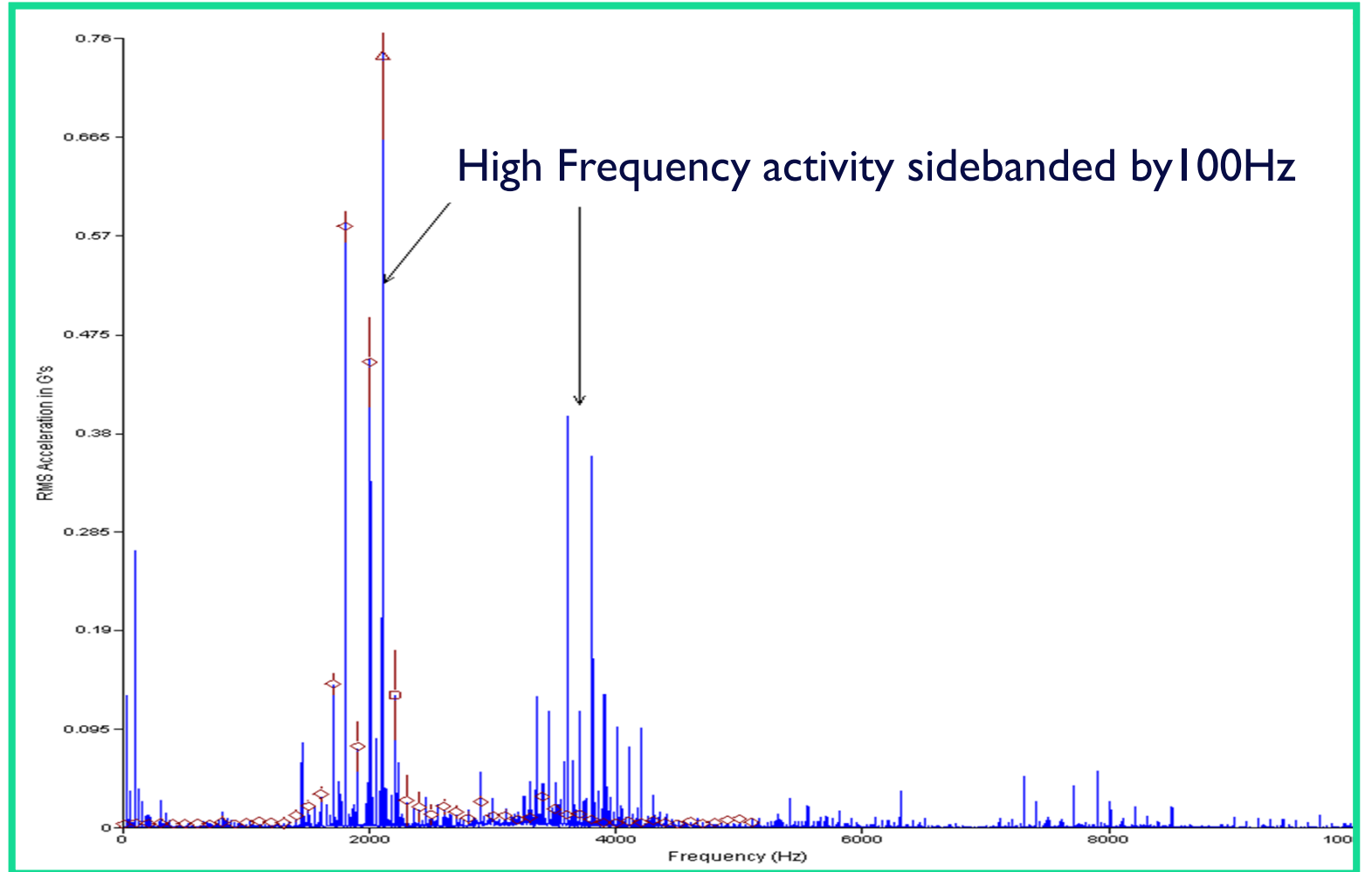




CASE I

ELECTRICAL DEFECT – ACCELERATION

→ The Acceleration spectrum displayed two mounds of activity with 100 Hz sidebands



CASE I

ELECTRICAL DEFECT – FINDINGS

☞ This is what was found, it was a surprise it was still running!



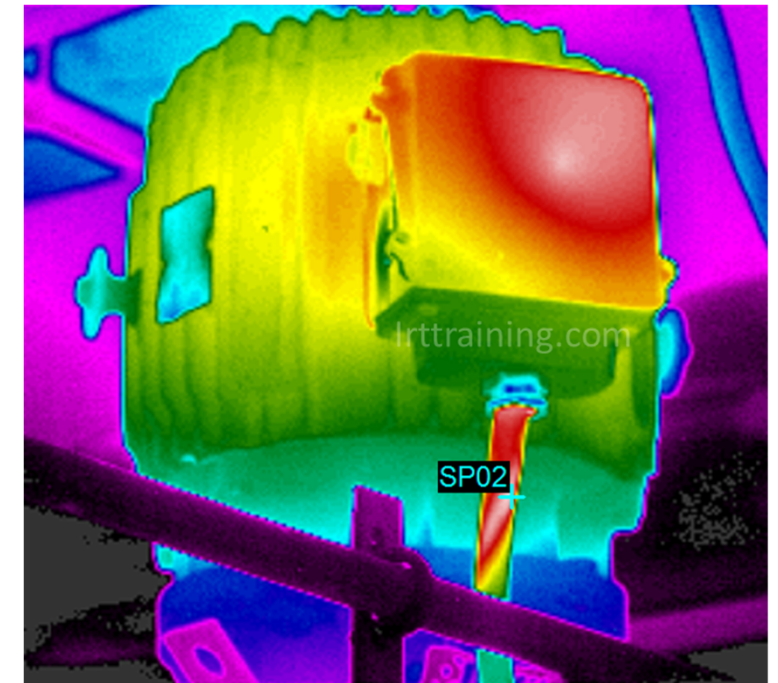
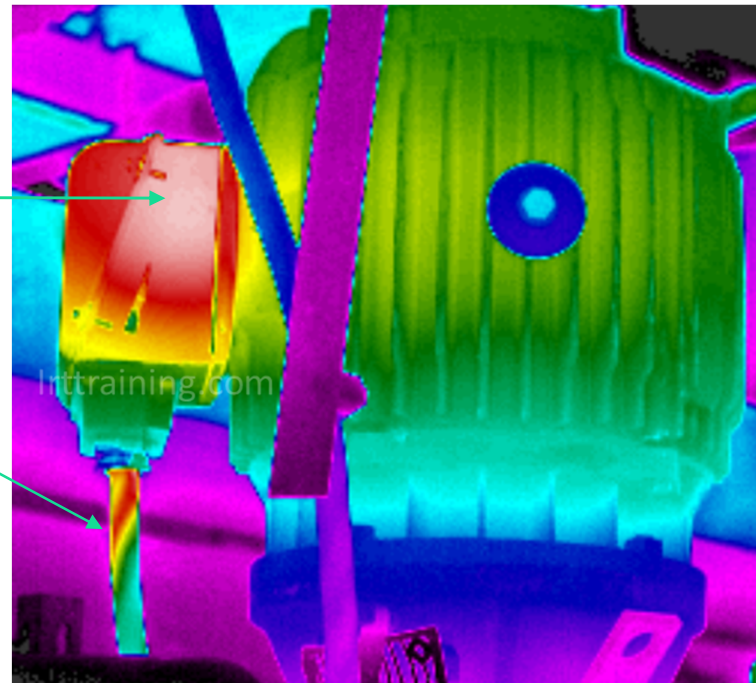
CASE I TECHNOLOGY EVALUATION

- Vibration Analysis did indicate an electrical anomaly in this case study, but not the actual cause
- Other Condition Monitoring technologies are available and in this case a more suitable quicker technology would have been infrared thermal imaging

- The image to the right shows a motor termination box with an area of increase temperature (105°C, ambient 32 °C)

- The temperature reduces as you move down the supply cable indicating internal high resistance

- The second image could indicate the position of the connection helping to identify which of the phase connections is at fault!





CASE I MIRCE EVALUATION

- The **Failure Cause** was **Human error during installation**
- The **Failure Mechanism** was **High resistive connection (Excessive temperature)**
- The **Failure Mode** was **Temperature Increase, Noise, and Vibration**

Summary:

The incorrect electrical connection, in the motor cable terminal box, initiated heat generation that in turn caused the vibration and noise

This was detected and occurrence of a negative functionality event prevented



JPS Reliability

A Reliable Plant is a Profitable Plant

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



JPS Reliability

A Reliable Plant is a Profitable Plant



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.



ABOUT MIRCE AKADEMY

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>

MIRCE is a trademark registered in the United Kingdom under No. 2338979 in respect of printed training materials and books, education and training, and, scientific research and consultancy in the name of Mirce Science Ltd. MIRCE Akademy is a Division of Mirce Science Ltd, a private company registered in England and Wales. Company Reg. No. 3675242. Registered Office, Woodbury Park, Exeter, EX5 1JJ, UK.



JPS Reliability

A Reliable Plant is a Profitable Plant

CONTACT JPS RELIABILITY



info@jpsreliability.com



<https://jpsreliability.com>



07387 986 454

JPS Reliability LTD is a Company registered in England under company number 12547245. Bristol, UK.