Solutions2.0

Virtual Conference

Presented by Reliabilityweb.com

Upcoming CRL Workshops

Dec. 12-15

Co-located with IMC-2017

Bonita Springs, FL

More information: www.reliabilityleadership.com

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db PRÜFTECHNIK

ARMS RELIABILITY
EMPOWER | EDUCATE | EQUIP

HEAR SDT MORE

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Advancing Infrastructure

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THE ULTRASOUND institute

http://imc-2017.com

Sponsors

FUNDAMENTALS OF LUBRICANT CONTAMINATION CONTROL

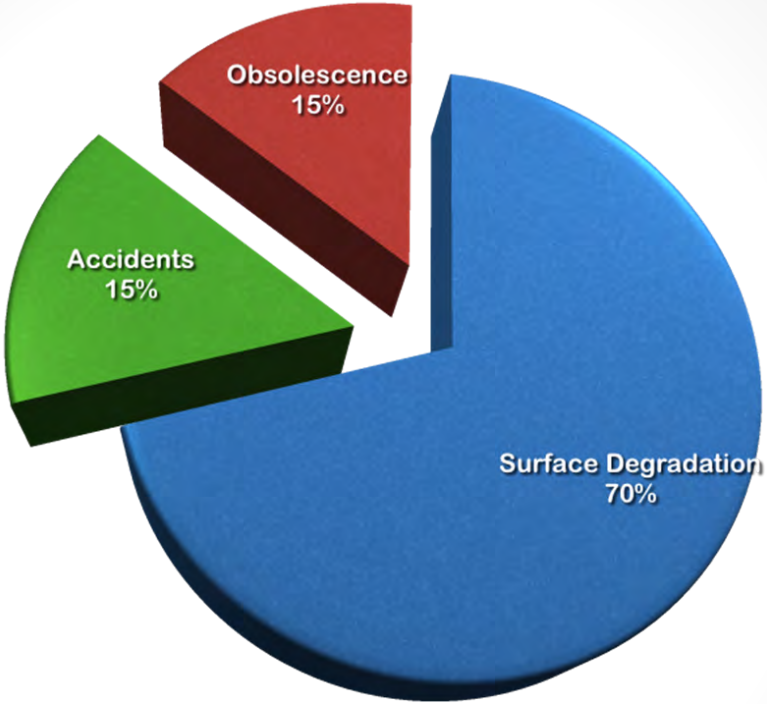
Jarrod Potteiger

Education Services Manager

Jarrod.potteiger@descase.com

251-591-6387

What Causes Machines to Fail?



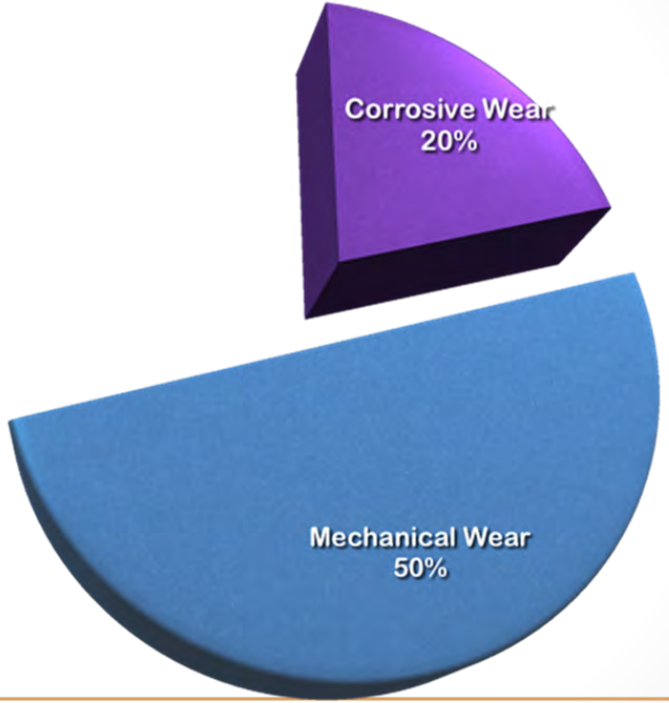
70% of loss of machine life is due to loss of surface material

Ref: MIT, E. Rabinowicz

Loss of Usefulness

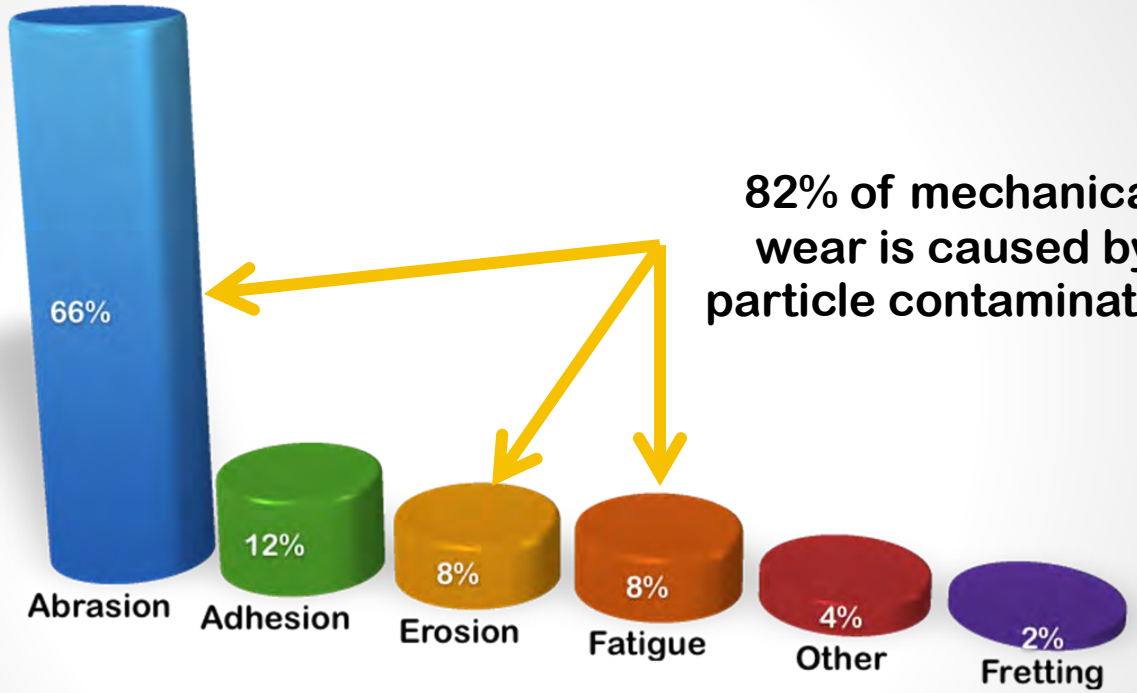
What Causes Surface Degradation?

Surface Degradation



Ref: MIT, E. Rabinowicz

What Causes Machines to Wear?



82% of mechanical wear is caused by particle contamination

Ref: NRCC, STLE

Contamination Control Strategy

Set Targets

Take Action

Measure Results

Contamination Control Methods

- **Contamination Exclusion**
  - Filter new oil
  - Use good quality breathers
  - Use sound application methods
  - Upgrade seals
  - Use hydraulic cylinder rod boots
  - Utilize non-invasive inspection / sampling methods
  - Use sound flushing practice for new or recently serviced equipment
  - Practice good parts management

- **Contamination Removal**
  - Upgrade system filters
  - Permanent off-line filtration
  - Portable off-line filtration
  - Vacuum dehydration
  - Centrifugal separators
  - Water absorbing filters
  - Coalescing filters
  - Air stripping
  - Electrostatic / BCA filters
  - System flushing

Studies show it costs about 10 times as much to remove contamination than it does to exclude it.

Holistic Fluid Management

New oil is not clean	2X dirtier	4X dirtier	8X dirtier

By the time oil arrives at your site, it is already too dirty for most equipment.

Delivery
ISO 19/17/15

Poor storage and transfer methods add to the contamination.

Storage
ISO 20/18/16

Dirty accessories compound the problem.

Dispensing
ISO 21/19/17

Not using the proper breathers allow more contaminants to enter the oil.

In Service
ISO 22/20/18

THANK YOU FOR YOUR PARTICIPATION

Keynote

Identifying Measurable Defects with Ultrasound: Proving Condition Monitoring Works

by Bob Lees, Corporate Trainer, SDT

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Knowns

- **Know value of asset to mills production**
- **Bearing failures in the past**
- **Vibration analysis was unable to detect**
- **Competitors ultrasound equipment detected no issues**
- **Identify bearing issue or not**

Vibration Analysis - detects

- ✓**Rotational Energy sources (unbalance, misalignment, vane pass)**
- ✓**Impacting**
- ✓**Turbulence**
- ✓**Friction**

Vibration Analysis - detects

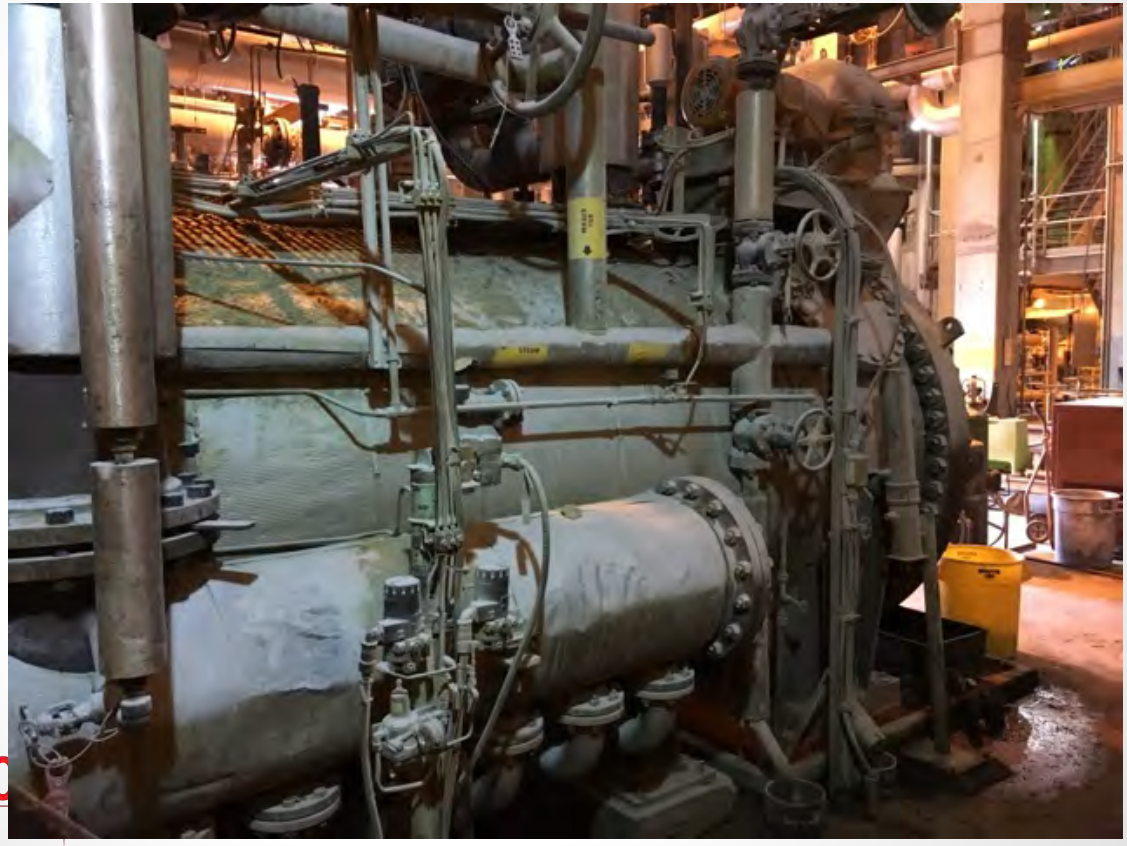
- ✓**Rotational Energy sources**
- ✓**Impacting**
- ✓**Turbulence**
- ✓**Friction**

Unfortunately this mechanical system had a great deal of rotational energy in equipment that was bolted to the vessel.

Ultrasound - detects

- ✓ **F**riction
- ✓ **I**mpacting
- ✓ **T**urbulence

Slow speed, a lot of axillary equipment supplying vibration

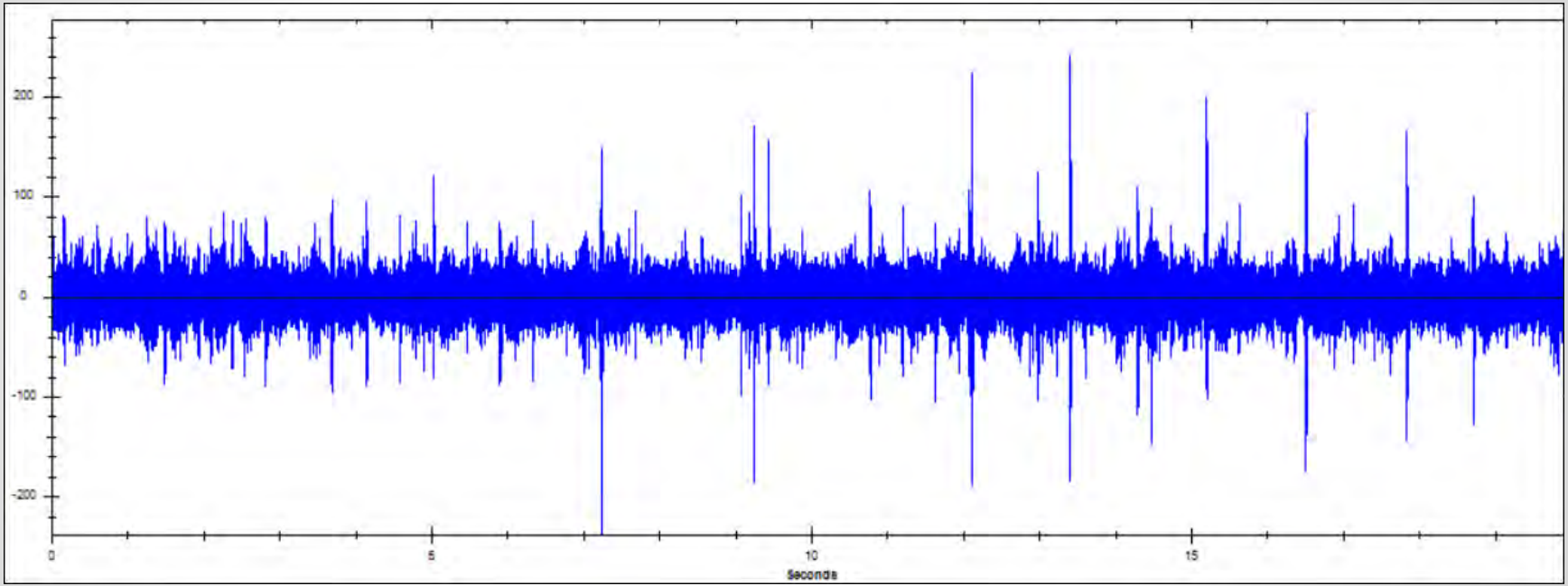


Bearings are there, hidden but there

Contact sensors

Work Began Before Site Visit- we had a PROCESS to succeed

Recorded a sound file



Information needs to be precise

SKF | SKF Engineering Calculator

ABOUT | HELP

SKF Engineering Calculator

Overview
Frequency Calculator
Radial O-ring Selector
Power Transmission Calculator
Rotor Balance Tolerance

Frequency Calculator

Bearing Frequencies Calculator
Gearbox Calculator
AC Electric Motor Frequencies
DC Electric Motor Frequencies
Flow-Induced Frequencies

› Feedback

Information

Click on ℹ for an explanation
* = Mandatory field

Bearing Frequencies Calculator

This calculator is used to calculate the different bearing defect frequencies of bearing applications. One can search for an existing SKF bearing or input the different bearing parameters manually. The bearing defect frequencies can be displayed in Hertz, CPM or in orders of the rotational speed.

Bearing Data

SKF bearing designation*	23056 CCK/W3 Search
Measurement system	○ Metric ◉ Imperial
Bearing type*	SRB
Pitch diameter*	13.98 in
Rolling element diameter*	1.378 in
Number of rolling elements (per row)*	27
Contact angle*	8.583333333333 degrees
Rotational speed*	8.97 rpm
Rotating ring*	◉ inner ○ outer

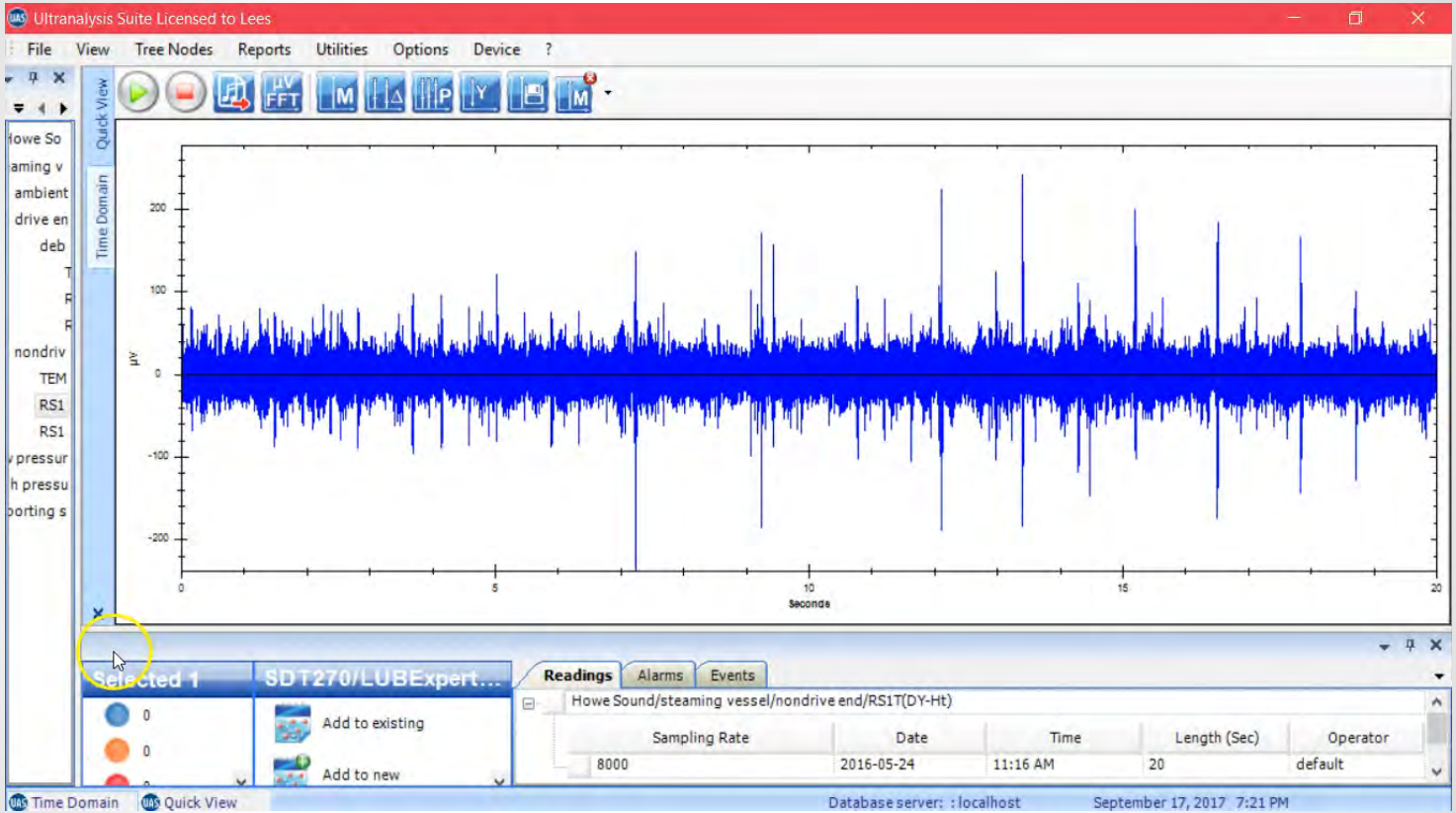
Calculate

Output

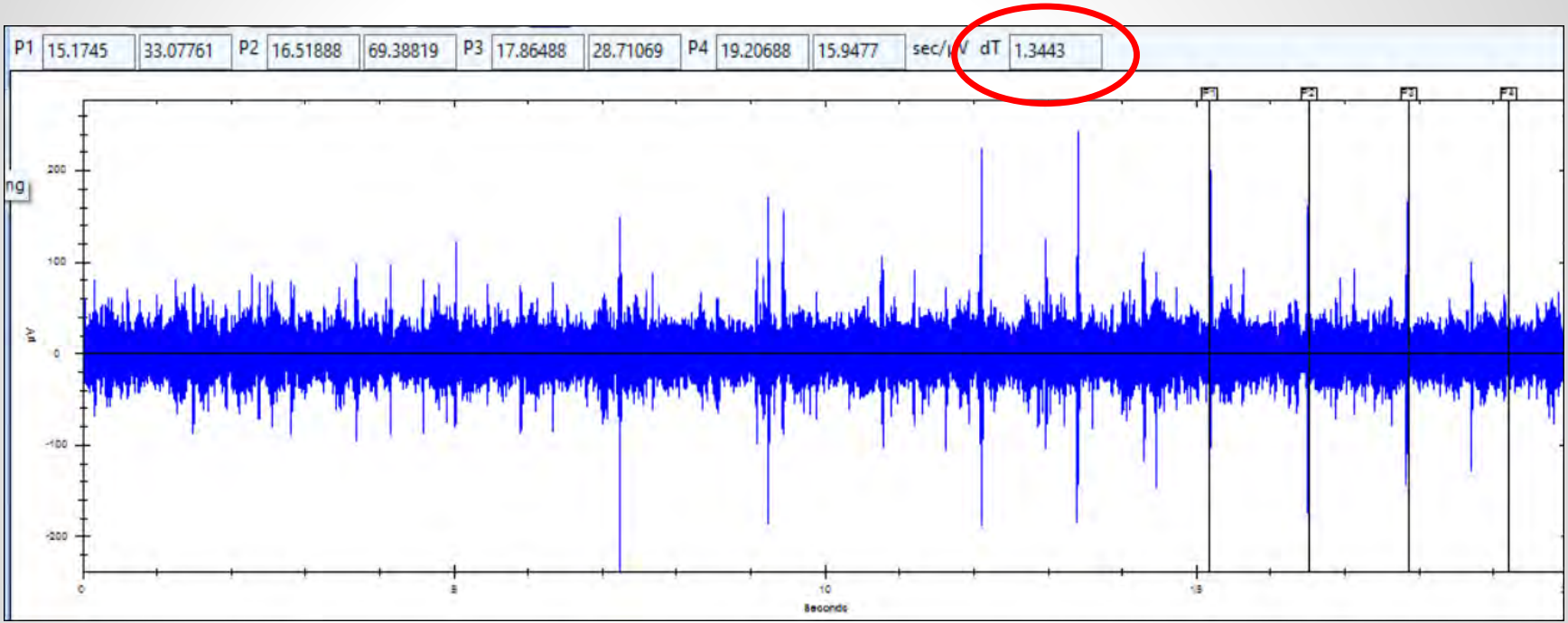
◉ Hertz ○ CPM ○ Orders

Shaft speed frequency	0.150 Hz
Inner race defect frequency (BPFI)	2.215 Hz
Outer race defect frequency (BPFO)	1.822 Hz
Cage defect frequency (FTF)	0.067 Hz
Ball spin frequency (BSF)	0.751 Hz
Rolling element defect frequency	1.502 Hz

Identify if harmonic events occur



The Impacts Don't Lie



Doing the Math

ΔT = 1.3443 From UAS

1/1.3443 = .75HZ

Does any of the bearing fault frequencies occur at .75 Hz

Find the Fault Frequency

SKF | SKF Engineering Calculator

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Thanks!

For more info, contact: bobl@sdthearmore.com

https://sdtultrasound.com

ARMS RELIABILITY

onePM

Asset Strategy Management OnePM

Making Reliability a Reality

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HOW ARMS RELIABILITY HELPS ORGANIZATIONS

- Asset Strategy Management (ASM)
- Maintenance Tactic Development and Review
- Master Data Enrichment
- Availability and Capacity Improvement
- Asset Investment Planning and Portfolio Optimization
- Root Cause Analysis and Defect Elimination
- Vulnerability and Risk Assessment

ENTERPRISE SOLUTIONS | TECHNICAL TOOLS | TRAINING | CONSULTING

CURRENT ISSUES WITH ASSET STRATEGY MANAGEMENT (ASM)

- RCM/FMEA efforts done in silos and results not leveraged across sites
- RCM/FMEA results not easily loaded or never implemented
- No visibility over changes made in field from original best strategy
- Hard to ensure C.I and a living program with personnel changes
- Strategies on critical assets not quantified and evaluated against cost and risk
- Current ASM efforts managed and stored in spreadsheets or SharePoint
- Predicted Performance not compared to actual performance

ASM BEST PRACTICES AND BENEFITS

Best Practice	Benefit
Standardization across similar asset types across the organization	Leverage learnings, improved reporting and data analysis
Share strategies and info across sites	Save time, $$$ and shares knowledge
All Reliability info in one system	No more spreadsheets, shared drives, static files, multiple logins and systems, and lower IT cost to maintain multiple systems
Cost and Risk justified strategies	Less $$ on reactive maintenance, no over-maintaining, less incidents, lower risk, more predictable performance
RAM/RBD study for capital projects/expansions	Ensure can meet availability targets and nameplate
Stewardship of maintenance tasks	Control, monitor and deploy effective changes on strategies to assets
Direct integration or formatted load sheets for loading changes to SAP	Ensures timely and accurate data entry into SAP, and completes implementation
BOM's, Spares, Materials all linked to equipment	See everything in one place, forecast Spares holding needs and costs, improved planning efficiency and not rely on OEM recs for spares

ASM Benefits

Reduce reactive maintenance

50%

Increased plant availability

1% to 4%

Maintenance strategy development & review

2x to 6x

Quicker and more Cost Effective

Reduction in Spares Costs from OEM recommendations

60%

Implementation into

CMMS

100%

Reduced safety risk

20%

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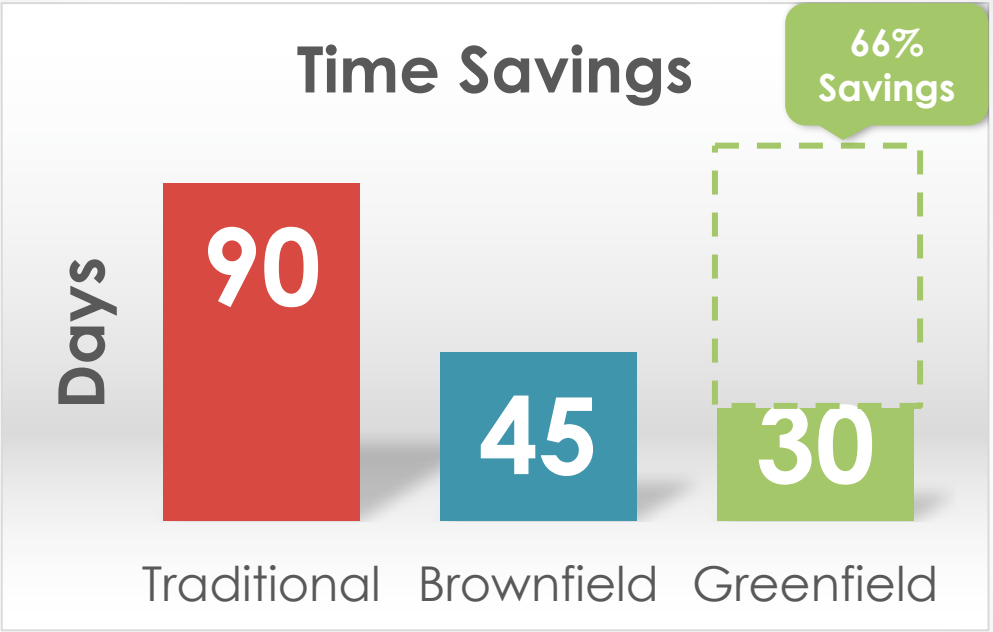
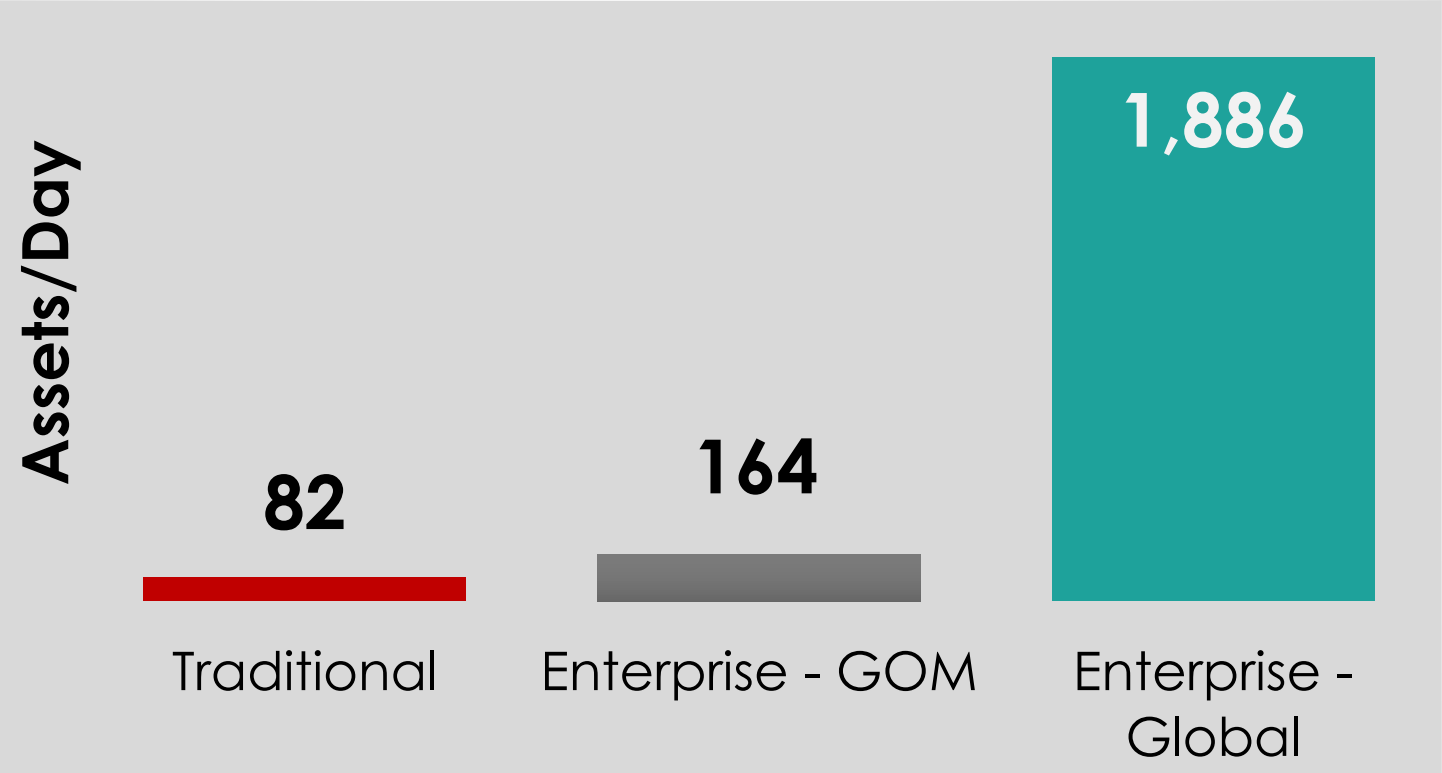
EFFICIENCIES OF ONEPM PROCESS



Develop optimum maintenance strategies for **~30,000** new greenfield assets based on **~150** unique equipment classes, in 1/3 of the normal time.

EFFICIENCIES OF ONEPM PROCESS



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NORTH/ CENTRAL / SOUTH AMERICA

P: +1 512 795 5291

AUSTRALIA / ASIA / NEW ZEALAND

P: +61 3 5255 5357

EUROPE / MIDDLE EAST / AFRICA

P: +44 1484 505 776

Questions & Answers

Thanks to Our Sponsors

Next Webinar

Date: Wednesday, November 29

Keynote

Building Information Modeling (BIM) Implementation to Achieve a Reliable Asset Management System and Deliver a TOTEX Future

by Laith Alfaqih, Senior Strategic Management Consultant, Stantec

Educational Session

by Kevin Stewart, KPS Reliability

We'd love to hear your feedback!
Email your questions or comments to
sean@reliabilityweb.com

Thank You for Joining Us!

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