Ultrasound, 1st line of defense

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Today's Topics

- ***Intro to UE Systems***
  Who we are and what we do
- ***Ultrasound technology***
  How the technology works for maintenance
- ***Applications areas***
  Where we use it
- ***Controlling Lubrication***
  How this technology can support you

About UE Systems

- Founded in 1973 in Elmsford New York, USA
- Over 40 years experience with ULTRASOUND
- We are a global company
- European Headquarters in the Netherlands
- Regional Manager for G-A-CH is located in Germany
- 2015 over 600 users trained in Europe

Progress of the Ultrasound Technology

- in the early days …… analog instruments

  Troubleshooter to detect failures

- Thereafter …… digital instruments

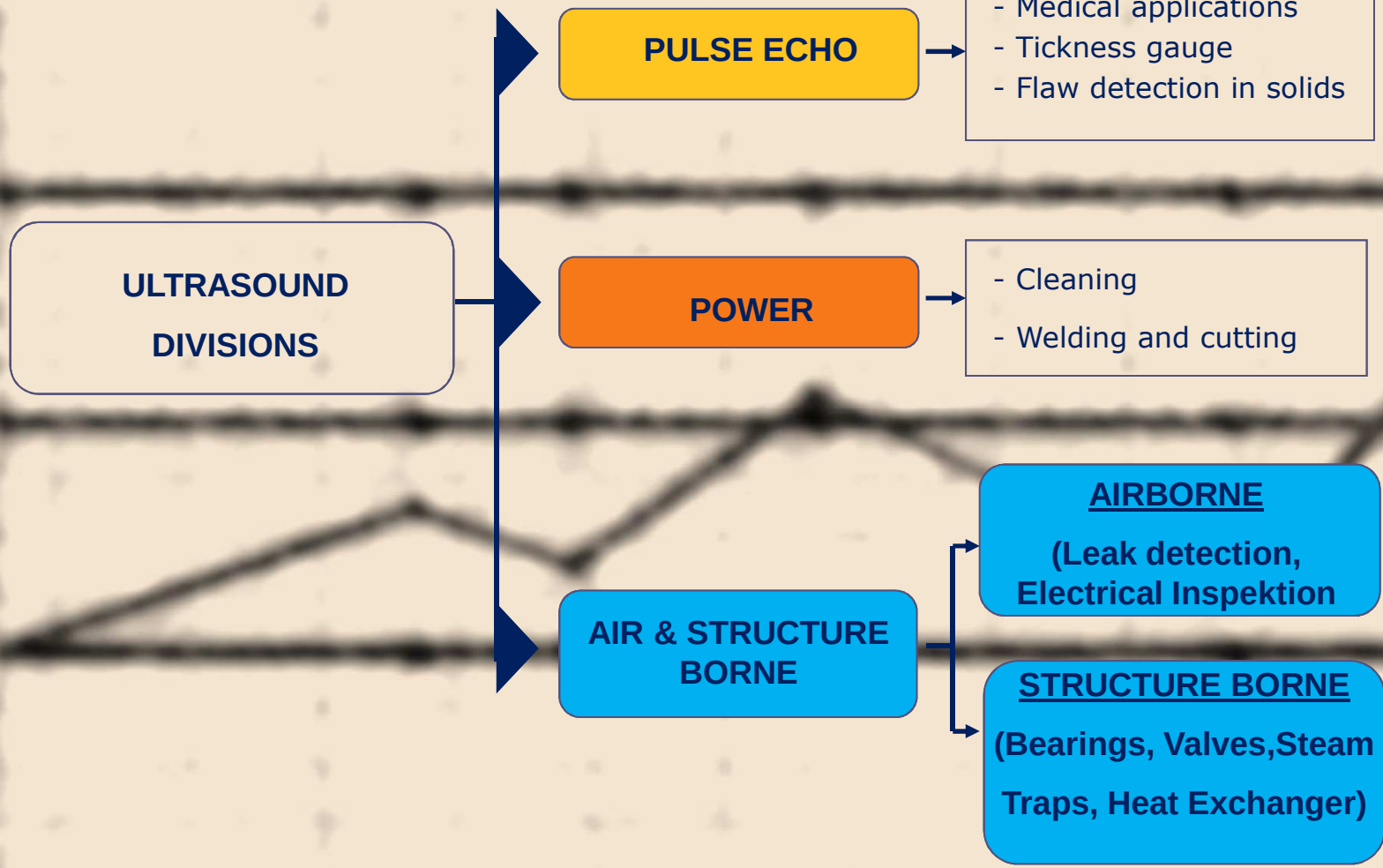
  allows sound recording and with help of the UE Spectralyzer analyses.

  Repeatability of Data and standards

- Today …… Software Analyses

  increasing demand of recordings, data collecting and reporting

Kinds of Ultrasound



Typical application areas

Leak detection (40 kHz)

- Pressure or vacuum, any type of gas
- Heat exchangers
- Tanks and boilers
- Window seal inspections

Valve inspection (25 kHz)

- Valve leak detection
- Steam trap inspection

Mechanical inspection (30 kHz)

- Condition monitoring of bearings
- Condition based lubrication
- Pumps for cavitations
- Conveyor belt systems

Electrical inspection (40 kHz)

Discharge testing on:

- Switchgears
- Power lines & isolators
- Transformers
- Circuit breakers

(Tracking, Arcing, Corona & mechanical looseness)

Speciality solutions for:

- Automotive WNWL
- Aircraft inspections
- Marine hatch testing
- Rail roads

Bearings

The lubricant used for a bearing is extremely reduced compared to what is usually needed. An excess of lubricant in the bearing can be harmful.

FAG Kugelfischer Georg Schäfer AG
Publ.- No. WL 81 115/4 SB "Lubricación de Rodamientos" Pág. 35

A correct period between lubrications depends on many factors. Recommendations can be based only on statistic rules .

SKF , México Web page bajo palabra Relubricación

Even if traditional rules and practices can be sometimes correct, it is evident that sometimes it doesn't work.

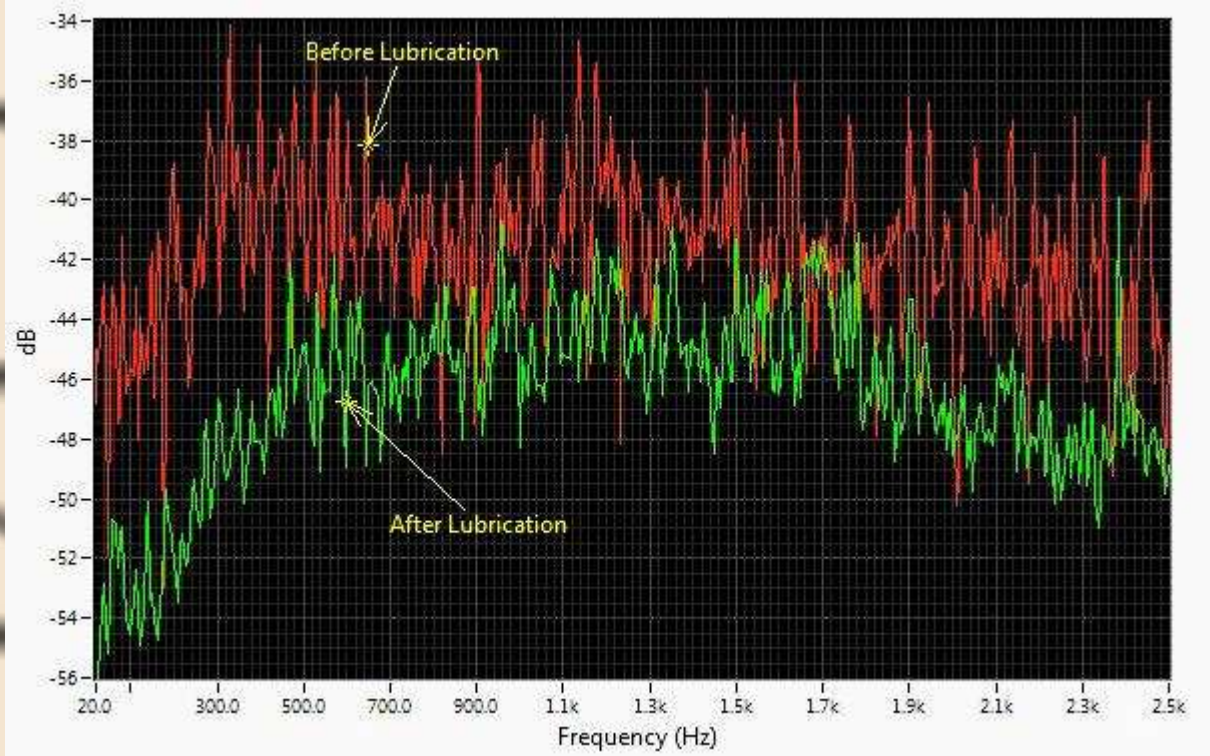
Noria Corporation, Lube-Tips Newsletter

Lubrication Can Hide a Bad Bearing for Only a Short Time

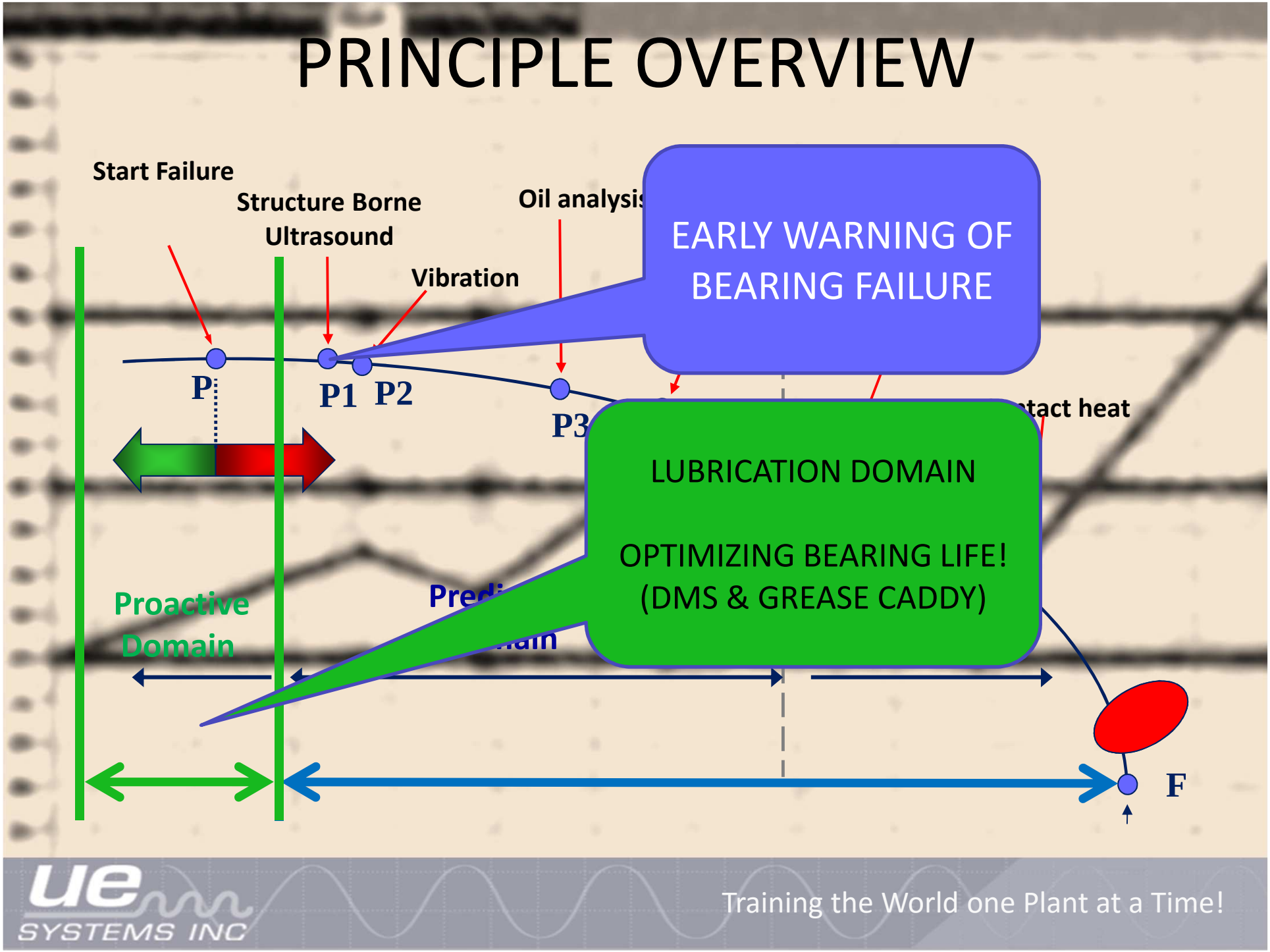
Good Bearing

Grease being applied

3 Minutes after Grease applied



PRINCIPLE OVERVIEW



BEARING MONITORING

Using ultrasound technology for trending bearing condition:

-> Indicating early warning of failure

-> Identifying lubrication condition

-> Avoiding over lubrication

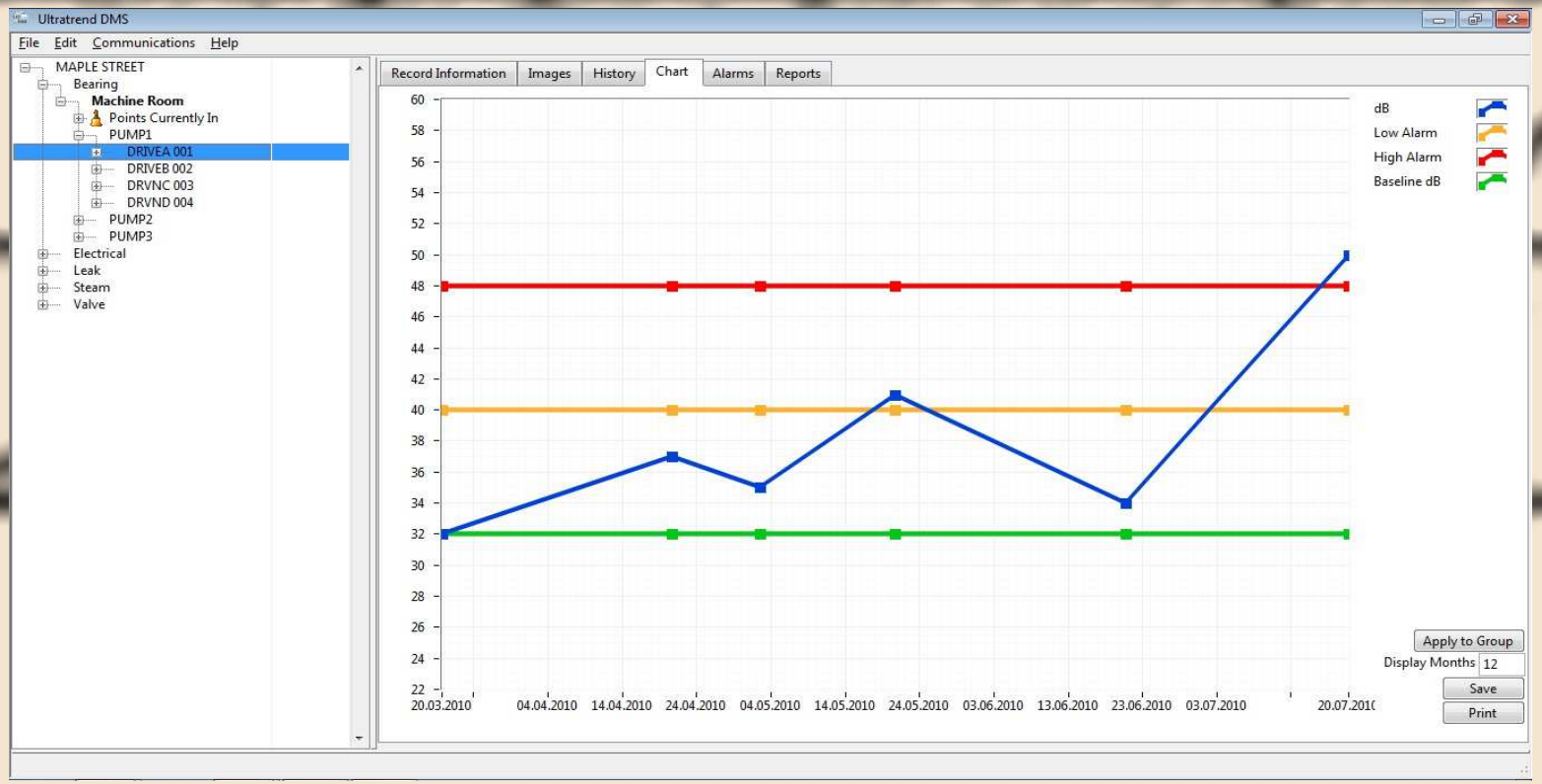
<u>Works also on slow speed bearings!</u>

Friction between mechanical components will cause a sound energy

BEARING MONITORING

The dB levels can be used to evaluate condition in the route-based data collection principle with help of DMS software:

- ***Baseline*** **+ 8dB** = Lubrication alarm
- ***Baseline*** + 12dB = microscopic damage
- ***Baseline*** **+ 16dB** = visual damage




What about lubrication?.... Seems simple.....
The dilemma: HOW MUCH & WHEN?

Action Levels

8 dB Lack Of Lubrication

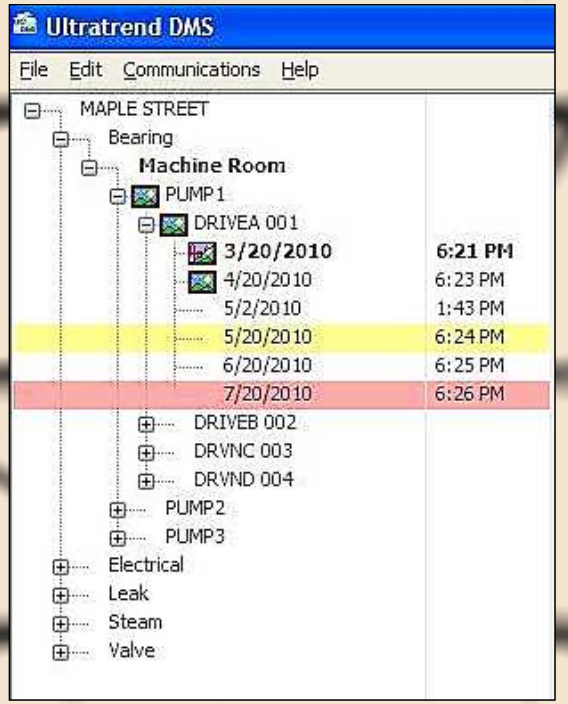
16 dB Damage (Visual Faults)

35 dB + Severe Damage (Approaching Catastrophic Failure)

Action Levels are values added above baseline readings to take corrective action, once those levels are crossed.

Before greasing → Inspection

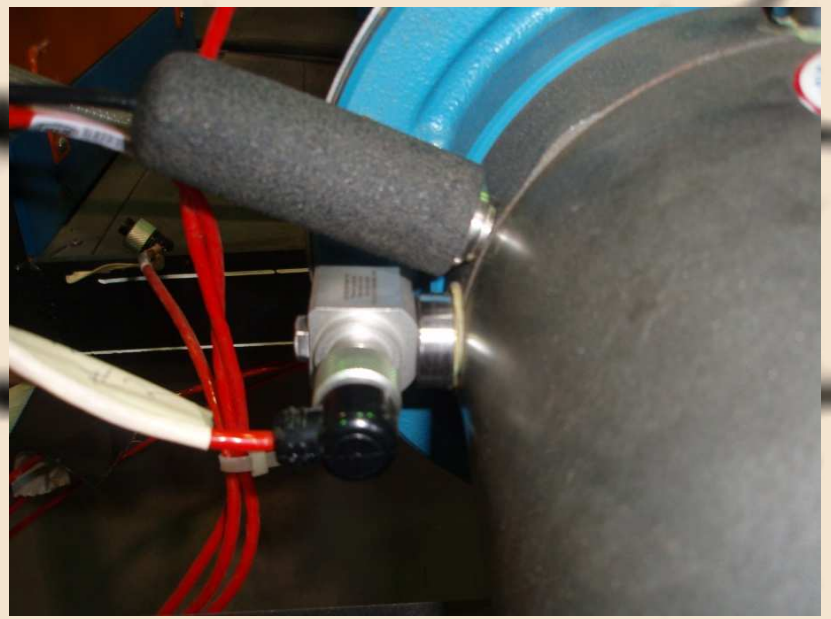
- Perform route walk-through to determine most efficient way to build route and note safety hazards!
- Group similar bearings i.e. same housing, rpm, load for comparison.
- Note any variables that might effect test data (ex: variable speed, accessibility).



How to establish a Baseline

There are several ways to do this. A good baseline sound wave should have a smooth white noise.

- Properly Installed New Bearing.
- Mean Value.
- Lowest Decibel.
- Mark First Reading



Data Collection with the Data Management Software (DMS)

- Create a Route in DMS.
- Upload Route from DMS
- Acquire Data.
- Record Baseline Sounds.
- Download route to DMS.
- Set Alarm Levels using Delta Values with DMS.
- Review Data.

Inspecting Bearings

- Review deviations and determine the need for further action. I.e. re-test and record for analysis, test with vibration, test with IR or plan corrective action such as lubricate, replace, align, etc.
- Review data to be sure there are no major deviations in the group.

Lubrication

AVOID LACK OF LUBRICATION BY:

- **Note increased sound**
  - **A Rise Of about 8dB over Baseline**
  - **Uniform rushing sound**
- **Add Lubrication until the sound level goes down.**
- **Use Caution - Lubricate a little at a time.**

Training the World one Plant at a Time!

Lubrication

- **Do Not Lubricate If Reading Is The Same As Baseline.**
- **Lubricate Enough To Maintain Baseline.**

Over Lubrication

Over Lubrication

Bare Wire

Summary controlled Lubrication program

- Indicating early warning of failure
- Identifying lubrication condition
- Avoiding over lubrication
- Also useable on slow speed bearings

Questions ?