Instrumented Bearing Diagnostics with Natural Crack Development

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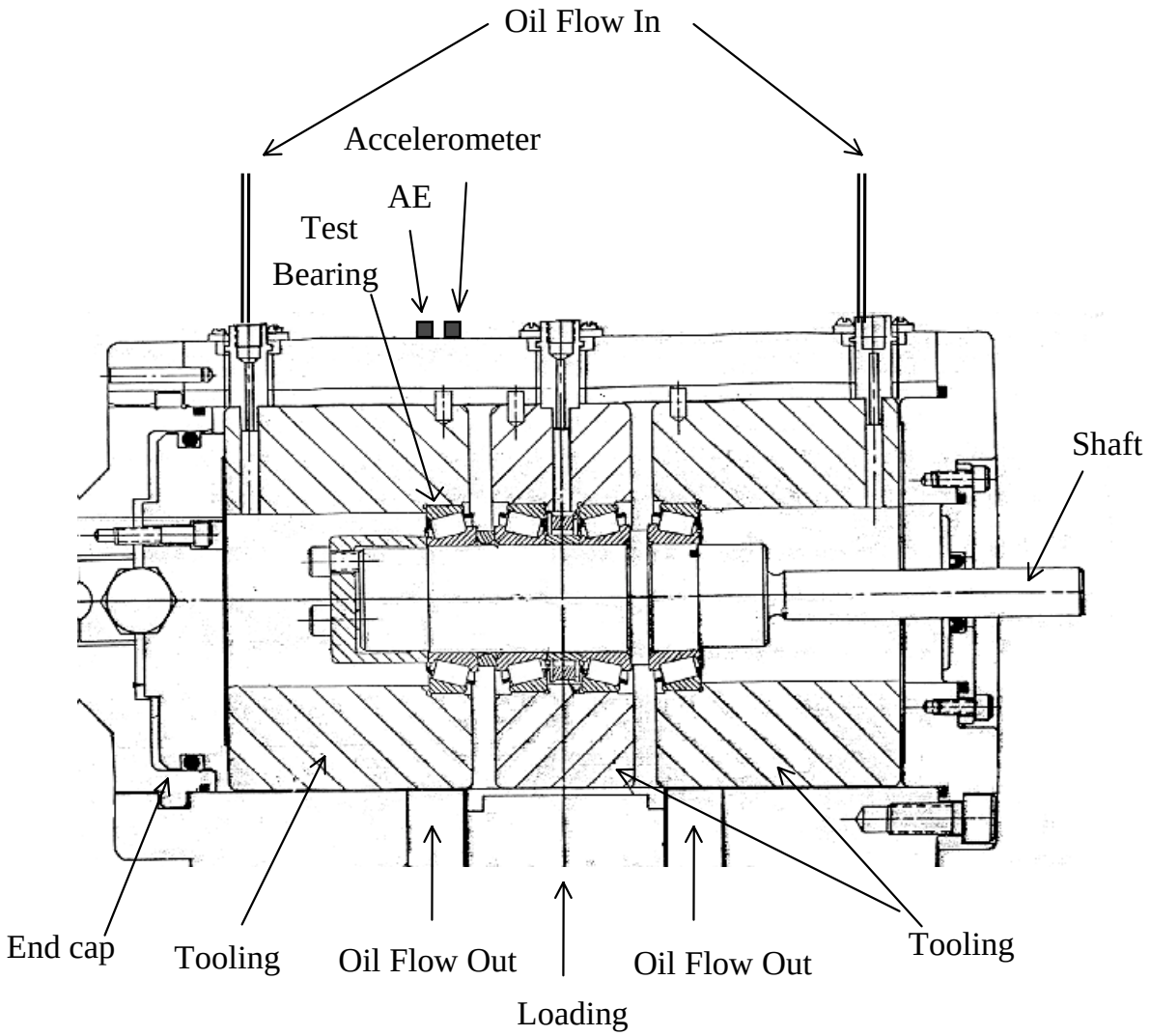
Objectives

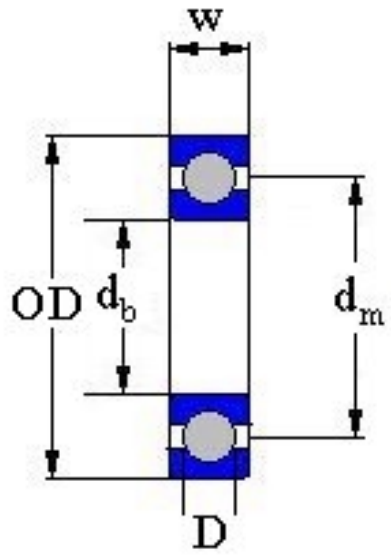
- Conversion to Visual Basic
  - Convert HFRT/ALE Routines and Stochastic Model from Matlab
  - Convert Data Acquisition and Control Interfaces from Labview
  - Results in a Single Platform Analysis Package
- Development of On-Line Capability
  - Enable “Real-Time” Accelerometer/AE Data Analysis During Testing
  - Make Graphical Results Available via the Internet
- Execution of Long-Life Tests
  - Test Bearings Under “Moderate” Conditions (~25% Rated Load)
  - Generate Failure Data Suitable for Verification of Stochastic Model
  - Prove “Real-Time” Analysis Programs
- Data Analysis
  - Evaluate HRFT/ALE Routines
  - Evaluate Stochastic Model

Tooling and Sensors



Tested Bearings

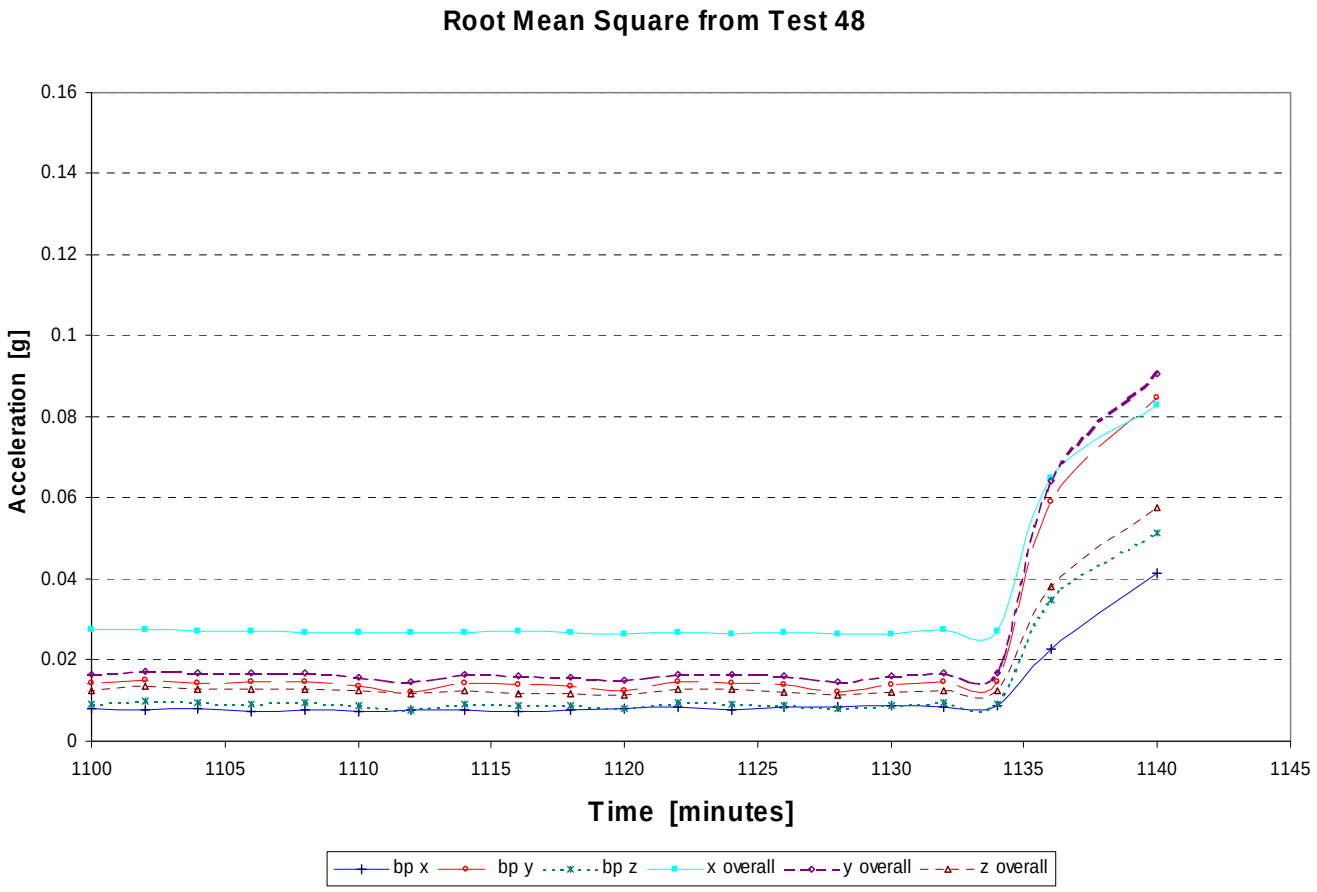
- **Fafnir 208K C2**
  - Radial Ball Bearing
  - Conrad or non-filling slot
  - No seals or shields
- **Dimensions**
  - Pitch diameter: 60 mm (2.3622”) d_m
  - Bore: 40 mm (1.5748”) d_b
  - 9 Balls, ϕ: 10 mm (0.3937”)



Time Domain

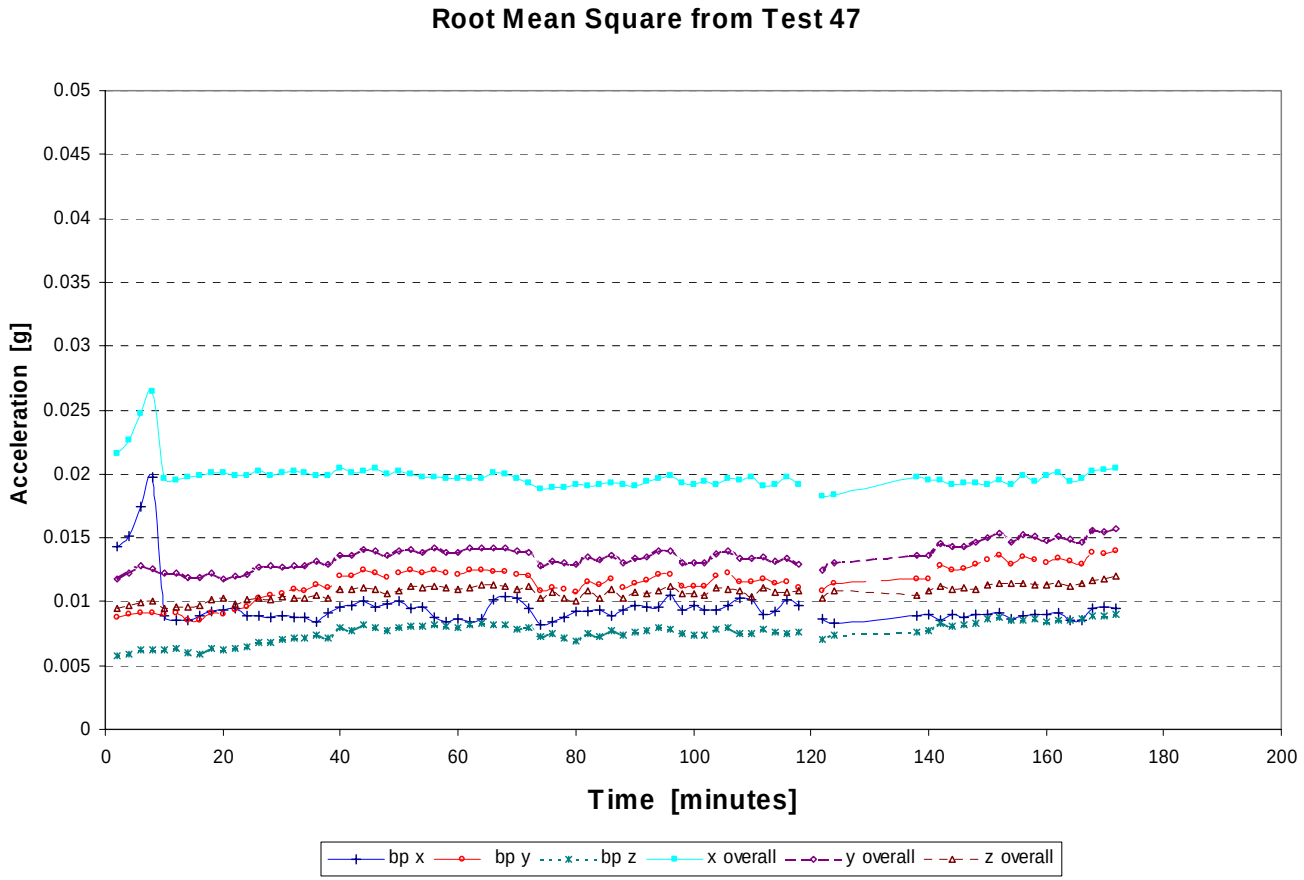
Inner Race Defects result in an increase in RMS.

In "Real-Time" mode, points will be added to the graph as data is acquired.



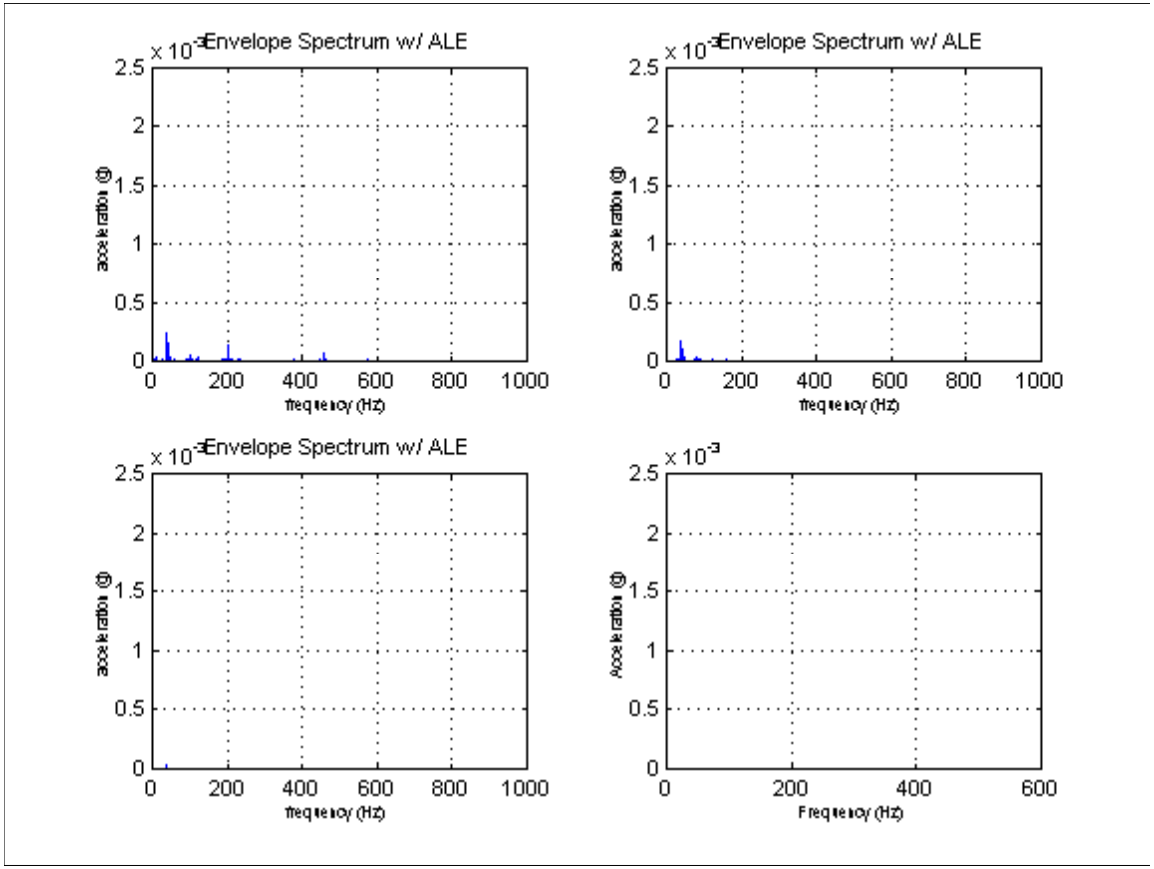
Time Domain

However, RMS remains constant in the presence of an Outer Race Defect.



Frequency Domain

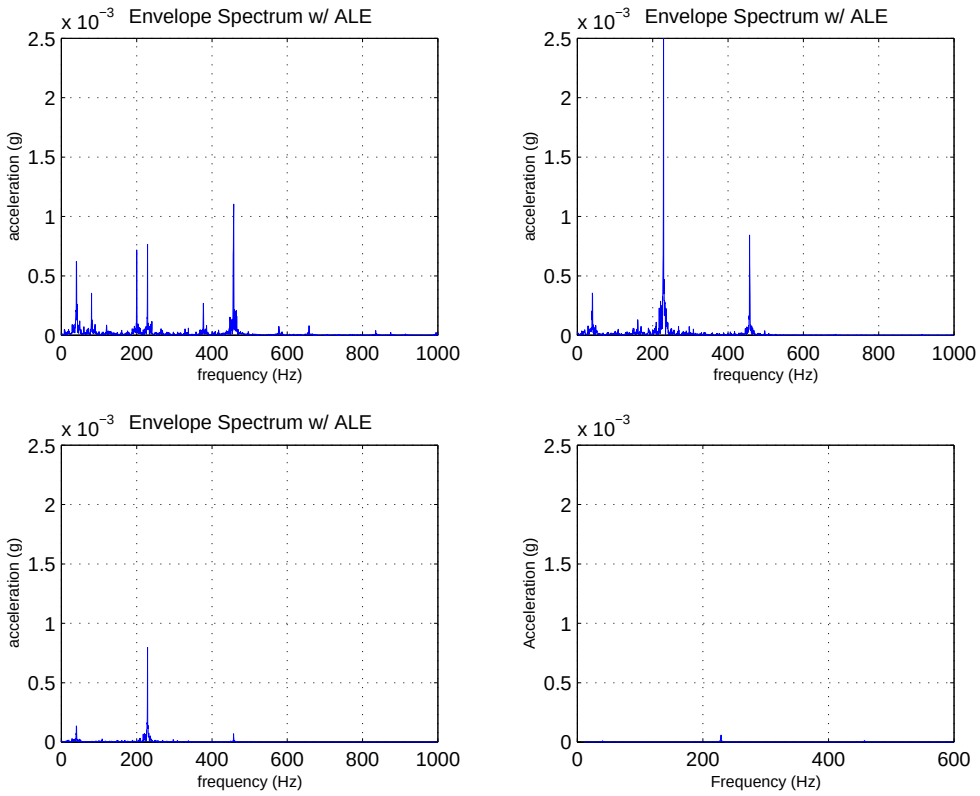
New Bearing Data



Frequency Domain

Bearing Data After 9 Hours

In "Real-Time" mode, frequency data can be compared to the baseline as data is acquired.



Networking Block Diagram