

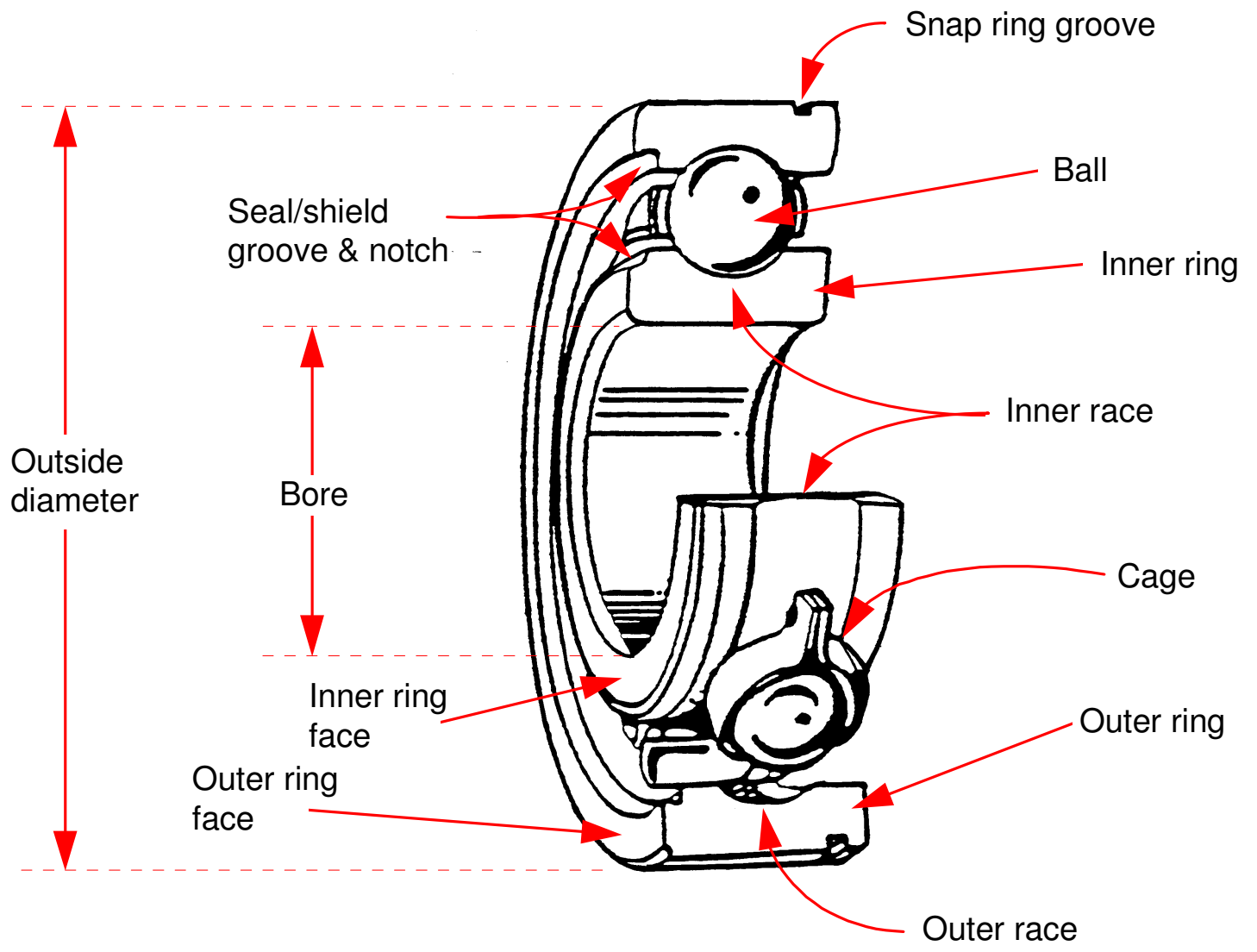
EA 101 Training

Roller Bearing Wear



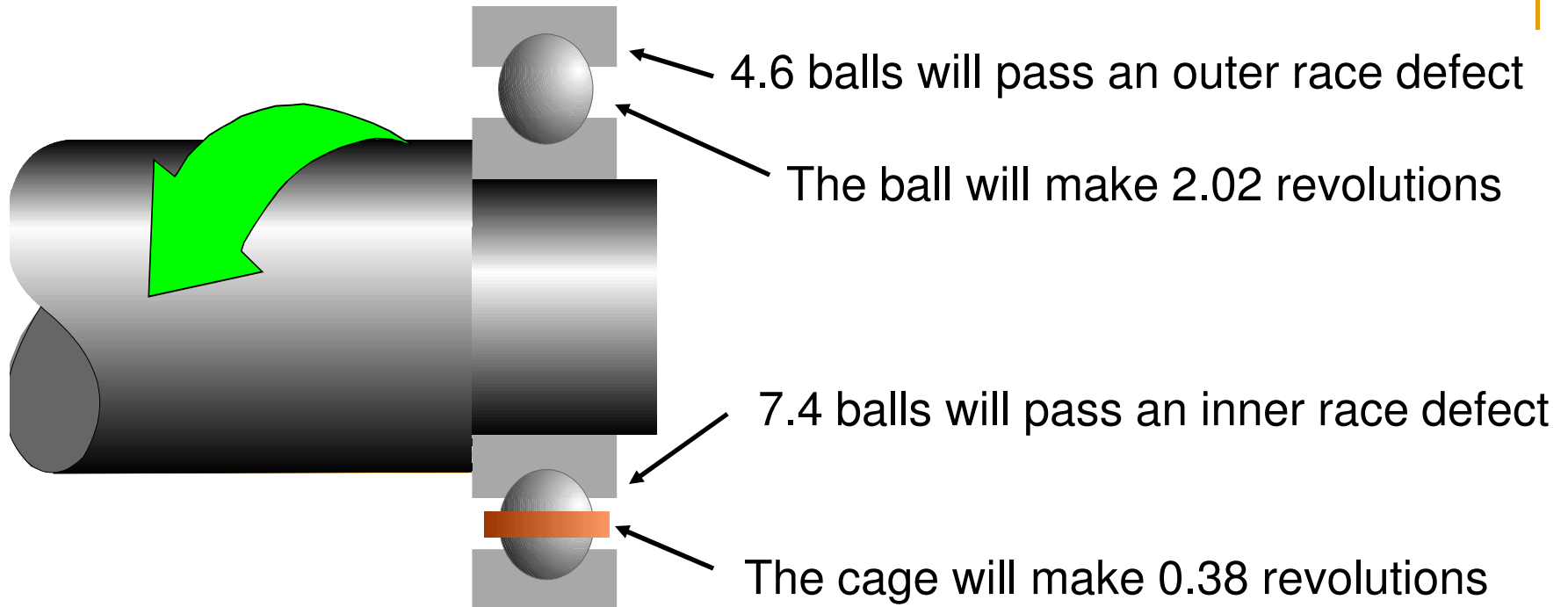
Roller Bearing Wear

- Every bearing wears differently
- Thousands of different types and sizes
- Key elements to analyzing bearings
- Must be trended



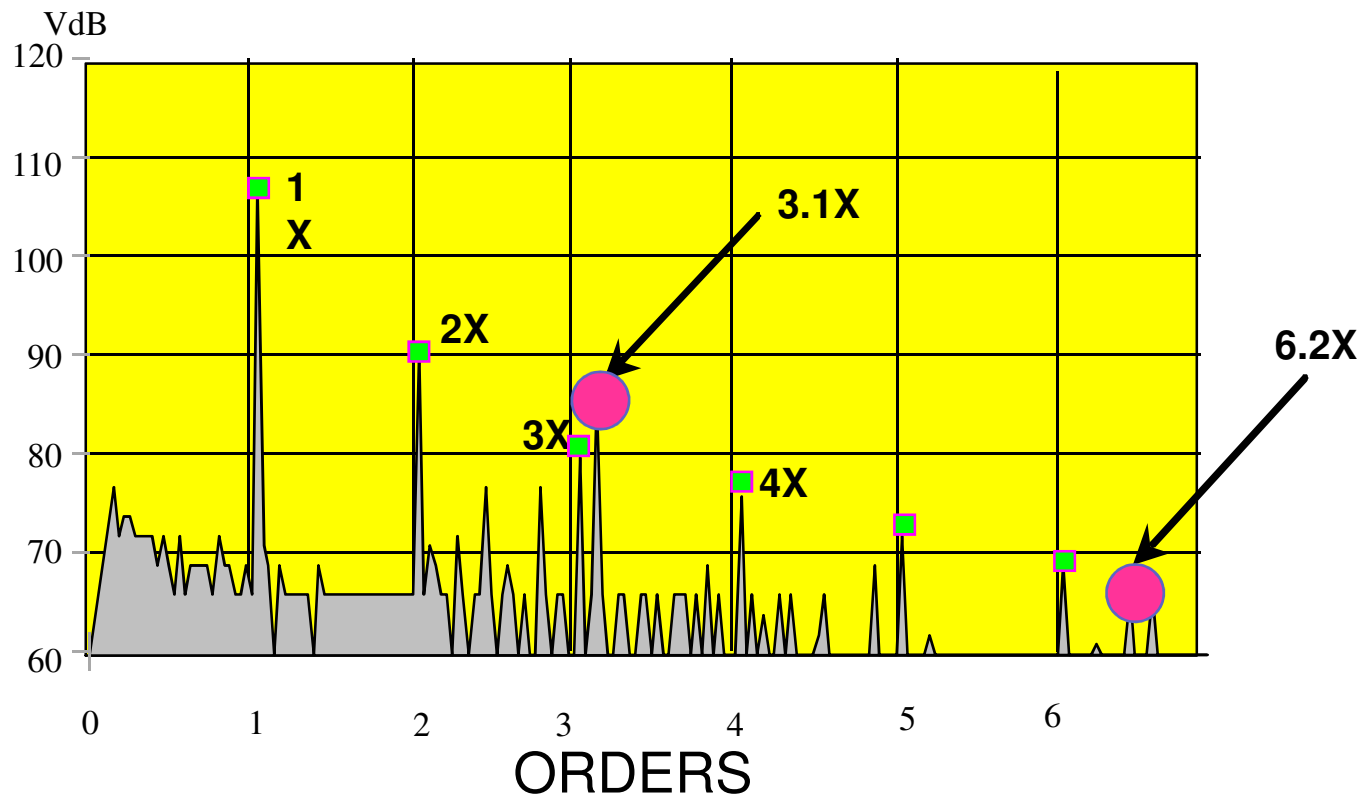
Rolling Element Bearings

For each shaft revolution:

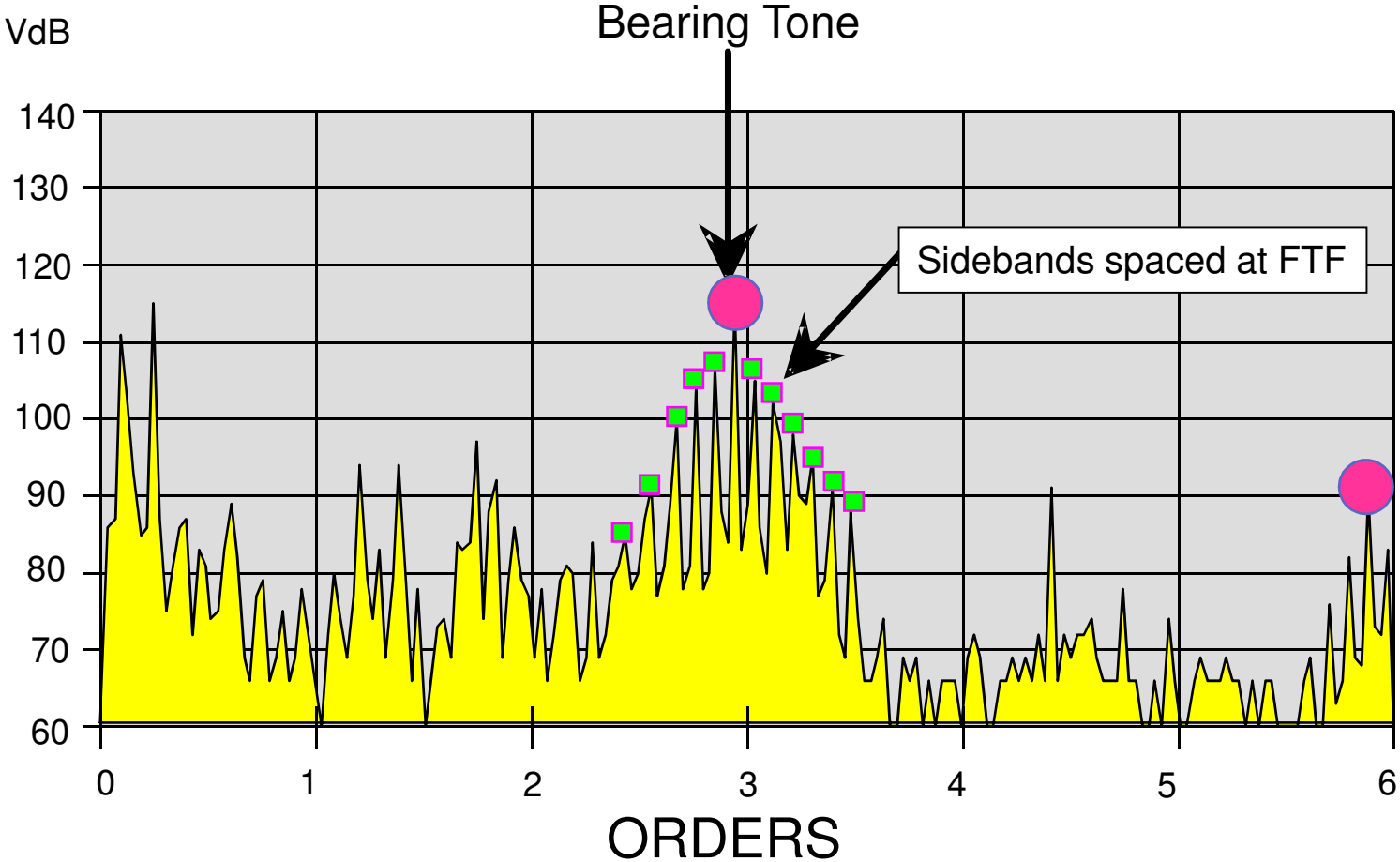


Bearing Tones in Spectrum

Non-Synchronous Frequencies



Bearing Tone Sidebands



The 9 Stages of Bearing Wear



Progression of Bearing Faults

Machine Without Bearing Problems



Progression of Bearing Faults

Stage 1 – Ultrasonic

No indication in Low Frequency

Machine Without Bearing Problems



Progression of Bearing Faults

Stage 2 – High Frequency

No indication in Low Frequency

Machine Without Bearing Problems



Progression of Bearing Faults

Stage 3 – 1st indication in Low Frequency

Slight Bearing Tone at 3.1X



Progression of Bearing Faults

Stage 3

Bearing Defect Getting Worse



Progression of Bearing Faults

Stage 4

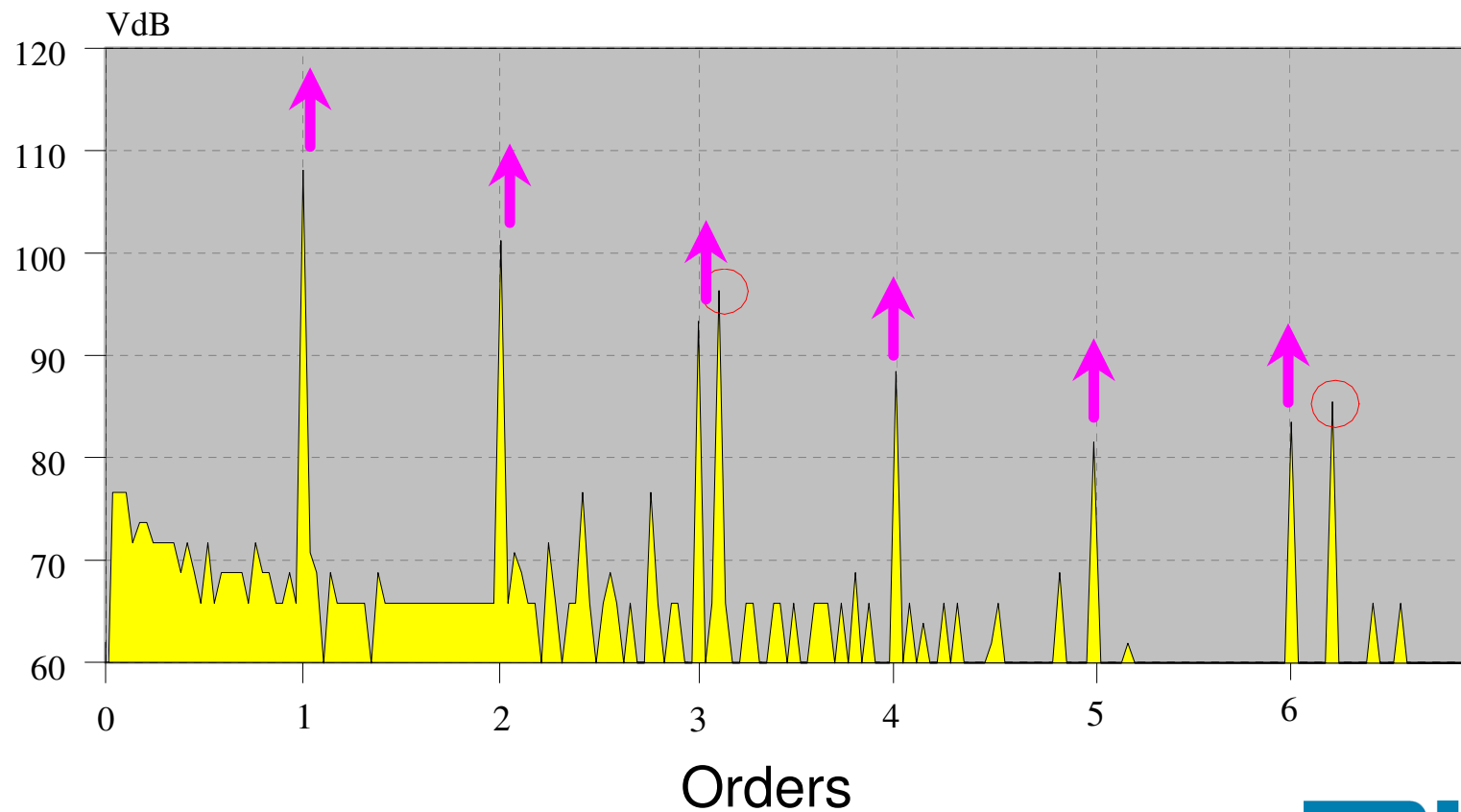
As Bearing Worsens, 2nd Harmonic Rises



Progression of Bearing Faults

Stage 5

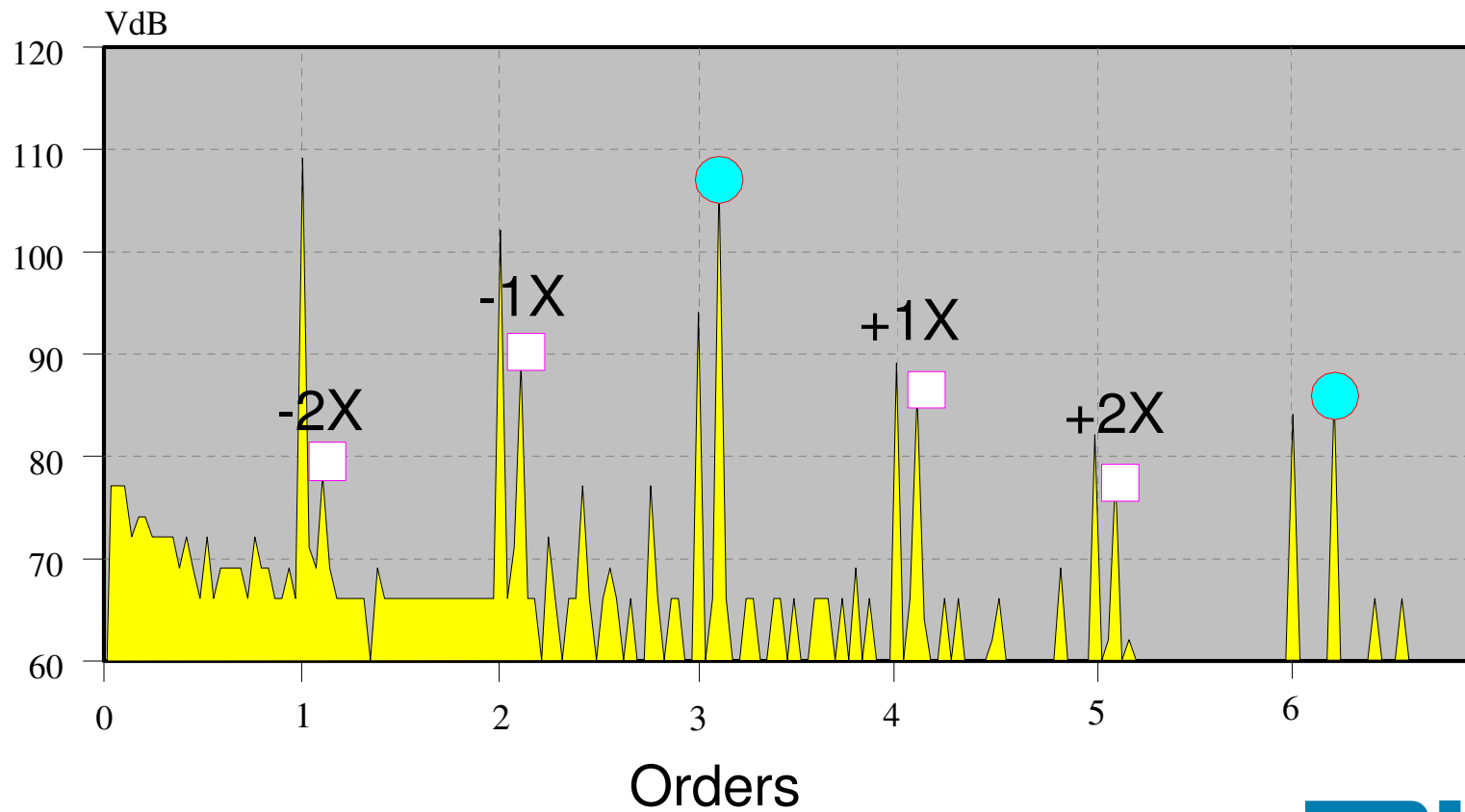
Looseness also Brings Up 1X Harmonics



Progression of Bearing Faults

Stage 6

1X Sidebands Around the Bearing Tone



Progression of Bearing Faults

Stage 7

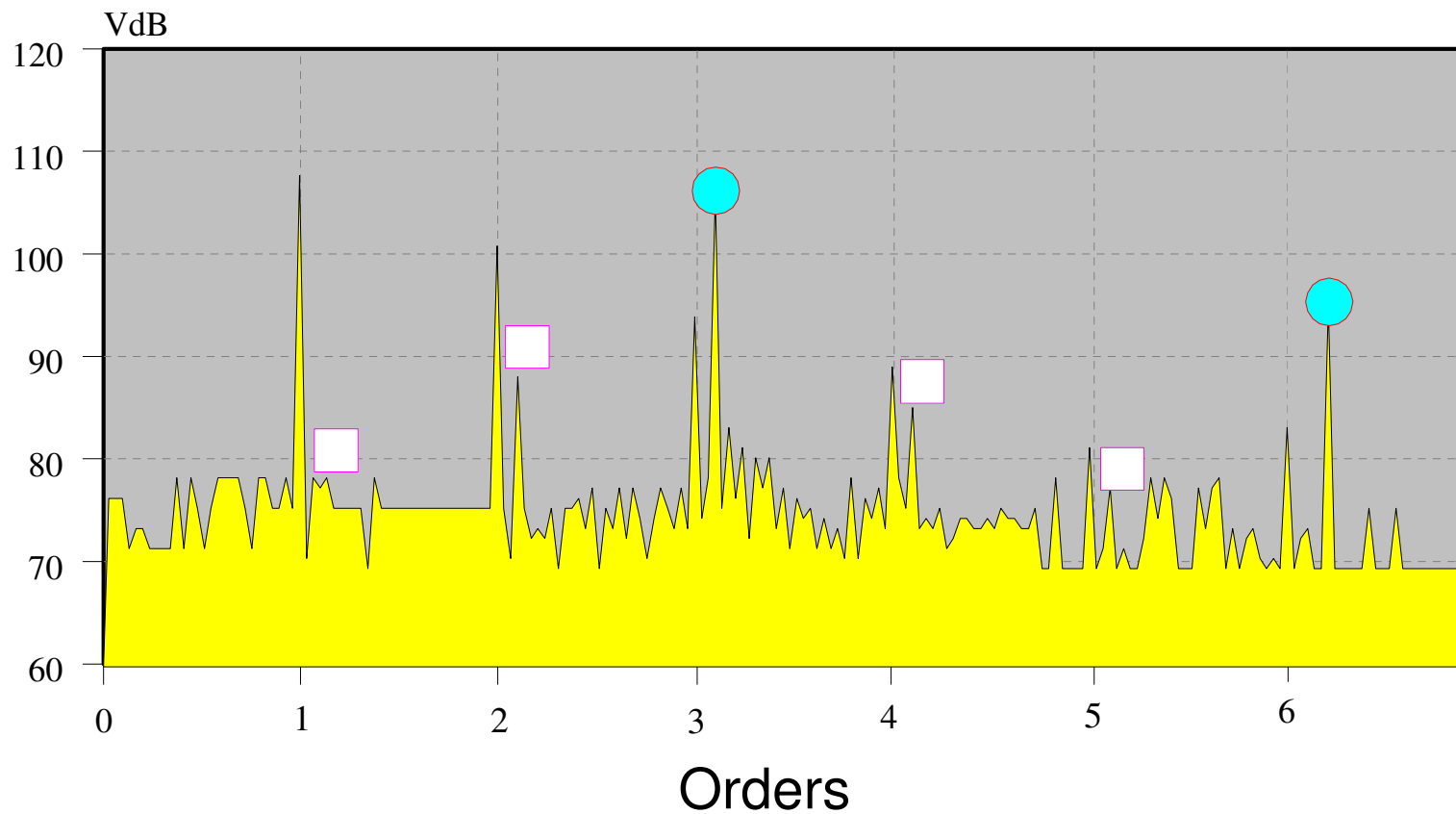
Haystack in Noise Floor as Wear Progresses



Progression of Bearing Faults

Stage 8

Entire Noise Floor Rises in Advanced Stages



Progression of Bearing Faults

Stage 9 – Too late

Machine Failure

